499401

UNITED STATES DISTRICT COURT
DISTRICT OF MONTANA

IN THE MATTER OF:	)
Libby Asbestos Site Lincoln County, Montana	)

DECLARATION OF PAUL R. PERONARD

I, Paul R. Peronard, in accordance with 28 U.S.C. 1746, declare as follows:

1. I am an environmental engineer employed as an On Scene Coordinator (OSC) by the United States Environmental Protection Agency ("EPA"), Region VIII, Denver, Colorado in the Office of Ecosystems Protection and Remediation. Since November 1999, I have been assigned to the Libby Asbestos Site ("the Site"), located in Libby, Lincoln County, Montana.

2. In my capacity as OSC, I am charged with directing and overseeing all investigations and response actions at the Site conducted pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), 42 U.S.C. §9601 et seq., and the National Contingency Plan (NCP), 40 C.F.R. Part 300. This includes oversight of all government and contract personnel working on the Site; responsibility for directing where and how to collect samples, make surveys, and conduct other related investigative actions; responsibility for directing any clean-up actions; responsibility for public communication of the EPA's actions and findings; and for EPA's overall interaction with the local medical community and health officers.

3. I have been an OSC for EPA Region VIII since April 1998. Prior to that, since November 1990, I was assigned as an OSC for EPA Region IV, located in Atlanta, Georgia. Before becoming an OSC, I was a Compliance Officer in EPA Region IV, enforcing the standards

Exhibit 1

of the Resource Conservation And Recovery Act ("RCRA") beginning in September 1985. As an OSC, I have directed and overseen response actions at over 30 CERCLA "Removal" Sites, and directed and overseen response actions at over 35 "classic emergencies," including train derailments, oil pipeline spills, highway accidents, illicit drug labs, and "midnight" drum dumps. I regularly teach training classes on such subjects as hazardous waste transport and disposal, fire chemistry, CERCLA and NCP response authorities, RCRA regulations, and waste treatment technologies. I have a Bachelor of Chemical Engineering from the Georgia Institute of Technology and have completed over 50 hours of graduate work in Chemical and Environmental Engineering.

4. The Libby Asbestos Site is located within Sections 3 and 10, T.30N, R.31 W. of the Libby Quadrangle, in the county of Lincoln. The Site includes a vermiculite mine ("the Mine"), two former vermiculite processing centers (the "Screening Plant," and the "Export Plant"), the road between the Screening Plant and the Mine, and homes and other businesses which may have become contaminated with asbestos as a result of the vermiculite mining and processing conducted in and around Libby. It is my understanding that vermiculite mining and associated processing began at the Mine around 1919 and continued until 1990. Universal Zonolite Company owned and operated the Mine and associated processing centers in Libby from the late 1920s until 1963. In 1963, W.R. Grace purchased Universal Zonolite Company. W.R. Grace owned and operated the Mine and associated processing centers (including the Screening and Export Plants) from 1963 until the early 1990s. In 1994 Kootenai Development Company ("KDC") purchased the Mine and portions of the Screening Plant.

5. Since as early as 1928 it has been known that the vermiculite ore at the Mine contained significant amounts of amphibole asbestos, generally of the tremolite-actinolite solution series. Concentrations of amphibole asbestos in the vermiculite ore range generally from 5-40% by weight, but there exist veins of relatively pure amphibole asbestos visible in a number of places within the ore body. Once mined, the vermiculite ore was beneficiated (by dry milling alone through 1975, by a combination of dry and wet milling from 1975 to the early 1980s, and by wet milling alone from the early 1980s until 1990) at the Mine, separating waste rock and overburden from the vermiculite ore. Once beneficiated, the milled ore was trucked to the Screening Plant, which was located on the bank of the Kootenai River, near the intersection of Highway 37 and Raney Creek Road. At the Screening Plant, the vermiculite was separated into five different size grades, through a mechanical screen-sieving process. Once screened, the sized vermiculite ore was transported across the Kootenai River, via a conveyor belt, to a rail loading station for distribution around the country. Limited historical data, collected by both EPA and W.R. Grace, indicate the asbestos content of the screened ore ranged from trace amounts to 8% by weight. The Screening Plant property is now used as the primary residence for the current property owners, and as a wholesale plant nursery. Beneficiated and/or screened vermiculite ore was also trucked to the Export Plant, located in downtown Libby, adjacent to Highway 37 where it crosses the Kootenai River. The two main operations at the Export Plant were the expansion (a.k.a. "exfoliation") of the beneficiated vermiculite ore in a dry kiln and the bagging and loading of vermiculite for rail and highway shipment. The Export Plant property is currently owned by the City of Libby, which leases the property to Mill Work West, a retail lumber business.

6. Asbestos can cause asbestosis (a scaring of the lung tissue resulting in reduced lung capacity) and is a recognized human carcinogen, causing lung cancer and mesothelioma (a lethal neoplasm of the lining of the chest and abdominal cavities). Cancer of the larynx and esophageal lining has also been associated with exposure to asbestos.

7. Based on research conducted by the U.S. Public Health Service, the National Institute of Occupational Health, McGill University, the Agency for Toxic Substances and Disease Registry, the Montana Department of Health, the Lincoln County Medical Office, and W.R. Grace, the EPA has determined that there exists widespread asbestos-related disease among Mine workers, workers at the Screening and Export Plants, their families, and workers at facilities around the country that handled Libby vermiculite. Based on this research, there is also substantial evidence that there are a large number of cases of non-occupational asbestos-related diseases among people in Libby, and among people residing around processing facilities around the country. Some of these cases include individuals who are not related to, and did not come in known contact with, workers at the Libby Mine or related processing facilities. A pulmonologist in Spokane, Washington, to cite an anecdotal example, has treated over 200 cases of asbestos-related diseases among people who had either lived in Libby or worked at the Mine. Out of this physician's cases were 48 incidents of apparently non-occupational exposure, including 18 with no ties to anyone working at the Mine.

8. In response to local concerns described in news articles, an EPA response team conducted an initial site visit on November 23, 1999. The initial investigation lasted three days and consisted of the following: a brief inspection of the Mine and processing facilities; interviews with local officials and some members of impacted families; an interview with a pulmonologist in

Spokane, Washington who specializes in the treatment of asbestos-related diseases; and the collection of a small set of environmental samples. Based on the results of the initial investigation, EPA initiated a larger scale investigation to obtain information on airborne asbestos levels in Libby to judge whether time-critical intervention was necessary to protect public health; obtain data on asbestos levels in potential source materials (at the Export and Screening Plants); and identify the most appropriate analytical methods to screen and quantify asbestos in source material. EPA's investigation into conditions at the Site continues to date.

9. EPA has found significant amounts of asbestos-contaminated soil at the Site. High concentrations of amphibole asbestos remain in the tailings pile and tailings pond at the Mine. At both the Export and Screening Plants there is significant asbestos contamination, with concentrations measured as high as 12% by weight in soil in some areas. Asbestos was disposed of at the two plants (either intentionally or inadvertently) during their years of operation. Relatively pure "rocks" of amphibole asbestos can be found on the ground at both Plants. Piles of unexpanded vermiculite are present at the Screening Plant. Recent air and dust samples at both locations also indicate the presence of amphibole asbestos. The current occupants and their families at both the Export and Screening Plant are exposed to this amphibole asbestos. The contaminated soils are subject to disturbance by wind, tracking through and off of the properties by human activities, and migration from potential new development and construction, all of which can cause re-entrainment of asbestos fibers and lead to additional asbestos exposure. Prior to EPA action, both locations were heavily trafficked by the public, with no control measures in place to prevent exposure to asbestos. Finally, EPA has collected air and dust samples from numerous homes and businesses in Libby.

10. On May 23, 2000 EPA issued an Action Memorandum calling for response actions at the Site. (See Attachment 1) Based on the facts contained within the Action Memorandum, and its supporting Administrative Record (published for review on July 28, 2000), EPA determined that there is a release or substantial threat of release of a hazardous substance (asbestos) at the Site which presents an imminent and substantial endangerment to public health, welfare, and the environment. Inhalation of asbestos fibers is the exposure pathway of primary concern at the Site. The Action Memorandum authorized response actions at the Screening and Export Plants, including the excavation, removal, and disposal of contaminated soil, to mitigate this endangerment. Subsequently, EPA has undertaken response actions pursuant to CERCLA and the NCP at the Screening Plant, and has ordered W.R. Grace to undertake similar response actions at the Export Plant. These actions generally include the cleaning and/or demolition of contaminated buildings, and the excavation, removal and disposal of contaminated soil.

11. The EPA, in conjunction with the Montana Department of Environmental Quality (MDEQ) is still evaluating the needed scope of response actions at the Mine itself.

12. The Screening Plant is composed of several parcels of property. At the initiation of EPA activities at the Screening Plant, these parcels were owned by four families or corporate entities: Mel and Lerah Parker; Gene Wise; Mark Owens; and the Kootenai Development Company (KDC). In addition, KDC owned all of the land associated with the Mine. EPA had obtained written or oral access to conduct its investigations and response actions from all of these affected parties. On July 18, 2000, W.R. Grace informed EPA that it had bought two thirds of the stock in KDC and that Mark Owens had sold his property to KDC. Subsequently, in a letter dated July 18, 2000, W.R. Grace rescinded all access agreements in effect between EPA and KDC

and specifically stated " ...the USEPA, and its representatives, contractors, agents, or guests are hereby forbidden from entering any KDC property..."

13. The Mine Site itself has been identified by the EPA, MDEQ, (see Action Memorandum) and W.R. Grace (see W.R. Grace Work Plan, dated July 28, 2000), as the preferred disposal location for asbestos-contaminated soil and debris removed from both the Export Plant and Screening Plant. Prior to W.R. Grace's July 18th letter, EPA worked with MDEQ and W.R. Grace over a period of months to identify appropriate disposal locations at the Mine. As discussed below, I characterize EPA's role in these discussions as facilitating the use of the Mine as a repository, thus saving EPA and W.R. Grace substantial sums of money that otherwise would be spent on off-site disposal. Thus, it was with great dismay that I received the July 18th denial of access.

14. Since the beginning of EPA's investigations in Libby in November 1999, and the subsequent response actions initiated this past spring, representatives of W.R. Grace and its contractors, EPA, MDEQ, and KDC have discussed the use of the Mine as a potential waste repository for asbestos related clean-ups in Libby. These discussions have included Mr. Alan Stringer, and Mr. William Corcoran, of W.R. Grace; Mr. Jim Stout and Mr. Ray Lidstrom, of Radian International, contractor of W.R. Grace; Mr. Mark Owens of KDC; Mr. John Constan and Mr. Pat Plantenberg of MDEQ; and myself on behalf of EPA. Some of these discussions also included enforcement staff from EPA. These discussions always considered the Mine as the most logical place to place the material removed from the Export and Screening Plants. The discussions centered around appropriate locations on the Mine to place the materials, given the various technical and legal constraints.

15. In April 2000, I met with Mr. Jim Stout, Mr. John Constan, Mr. Alan Stringer, and Mr. Mark Owens at the Mine to discuss potential locations to use as a repository. At that time an area known as "Hole 23" was thought to be the best location. In May 2000, the EPA received a letter from the MDEQ objecting to the use of Hole 23, but requesting instead to use the excavated material to shore up an eroded area on the "tailings pile." After reviewing this request, I discussed this idea with the EPA's engineering contractor, CDM, Mr. Stout, Mr. Stringer, Mr. Plantenberg, and Mr. Constan. At that time it was felt by all but Mr. Plantenberg that this was not practical at this time. Subsequently, a meeting was held at the Mine with Mr. Stout, Mr. Stringer, Mr. Owens, Mr. Plantenberg, Mr. Constan, myself, and a few others present. At that time, all agreed that two areas, Area 12 and Area 19, would be the best locations to place soil and debris giving consideration to issues of permitting, practicality, cost, future use and protection of public health.

16. Prior to W.R. Grace's acquisition of the KDC stock I was involved in several discussions with Mark Owens of KDC regarding settlement of KDC's liability at the Site. EPA wanted to formalize our earlier discussions with KDC, proposing to provide KDC with appropriate liability protections in exchange for use of the Mine Site as a repository for contaminated material removed from the Screening Plant (which includes KDC property). Upon information and belief, all of the amphibole asbestos contamination at the Screening Plant originally came from the Mine Site. On June 1, 2000, Ms. Kelcey Land, EPA Region VIII transmitted paperwork to KDC to assist in establishing KDC's financial ability to participate in such a settlement.

17. On June 28, 2000, at their request, I attended a meeting with W.R. Grace and its

contractors to discuss their Work Plan for the clean-up of the Export Plant. Members of MDEQ attended by conference call. In addition to discussing their Work Plan, W.R. Grace requested that EPA consider a consolidation of the hauling of waste to the Mine property (which was still controlled by KDC at this time) by W.R. Grace personnel as an alternative to running parallel operations. I indicated that EPA was willing to consider the proposal. During this meeting Mr. David Cleary, attorney for W.R. Grace, expressed some reservation about W.R. Grace using the Mine Site for disposal, and suggested that W.R. Grace might prefer to pay the extra cost to haul its waste to Spokane, Washington. At that time W.R. Grace's draft Work Plan contemplated both options. I stated clearly at that meeting that the EPA considered the preferred alternative to be the Mine property, and that we were actively pursuing a deal with KDC to further that end.

18. On June 30, 2000, I attended a similar meeting with W.R. Grace personnel to further discuss their Work Plan. During that meeting the MDEQ provided assurance to W.R. Grace that if disposal of asbestos-contaminated material at the Mine was done under the UAO, the MDEQ did not see any adverse affect on the status of KDC's reclamation permit.

19. On July 5, 2000, I attended a meeting at EPA Region VIII offices in Denver, Colorado, with representatives of W.R. Grace, MDEQ and EPA. This meeting was arranged by EPA at the request of W.R. Grace to assist W.R. Grace in obtaining MDEQ's comments on and approval for use of the Mine as a disposal site. On July 18th, after having purchased a controlling number of shares of KDC, W.R. Grace denied EPA access to the Mine.

20. Given W.R. Grace's denial of access, I have asked EPA's attorneys to seek access to the Mine to effectuate EPA's response actions at the Libby Asbestos Site (particularly the removal of asbestos contaminated soils from the Screening Plant and the disposal of those soils at

the Mine) for the following reasons:

a. Proximity and Cost. The Mine is within eight miles of the Screening Plant. The nearest permitted asbestos disposal location with the capacity to handle the volume of waste expected to be generated from the Screening Plant is in Spokane, Washington, some 159 miles from Libby. This would not only increase the cost of the Screening Plant clean-up by at least $5 million in trucking and disposal fees, but would also increase the time required to complete the action by several months. Greater time in completion increases the potential for exposure, thus increasing the risk to human health.

b. Traffic Patterns. It is anticipated that over 7000 truckloads of asbestos contaminated material will be shipped from the Screening Plant alone. Use of the Mine as a repository for the shipments from the Screening Plant would completely remove transport from public roads (the US Forest Service and Lincoln County have agreed to jointly close the road to the Mine, "Raney Creek Road") and the waste from the Export Plant would only travel along approximately 4 miles of Highway 37. Neither haul route would pass through a town or city. By contrast, going to Spokane, the routes would pass through the center of dozens of communities in three States: Montana, Idaho, and Washington. Heavy truck traffic through populated areas over public roads increases the chance of a traffic accident, while wasting fuel and increasing air pollution. While the EPA believes it is possible to manage these risks, it is obviously more prudent to avoid them altogether.

c. Consolidation of Contamination. The levels of asbestos at the Export and Screening Plants are generally much lower than those that currently exist at the surface of the Mine. Thus, the Mine itself will have to be managed as an asbestos contaminated area indefinitely. By consolidating the wastes at the Mine it minimizes the number of areas where amphibole asbestos contamination will have to be managed in the long term. By cleaning the two former processing centers, while adding no new areas of contamination, landfill space is preserved, and two large tracts are put back into productive use. Also, by using the Mine a minimal number of personnel will have to handle and manage the amphibole contaminated soil and debris.

d. Improvement of Mine Conditions. The material excavated from the Screening and Export Plants contains a large amount of topsoil suitable for vegetation growth, something that is in short supply at the Mine. The MDEQ has specifically requested of the EPA that the excavated material be placed on the mine in such a way as to help facilitate future mine reclamation and planting. As a result, the EPA and MDEQ have picked locations on the Mine Site where the placement of the asbestos contaminated soil and debris removed from the Screening and Export Plants will reduce slope angles, reduce erosion, and help enhance current and future re-vegetation efforts. The net effect will improve the condition and value of the Mine property.

e. Fairness. The contaminated materials arising from the response activities at the Screening Plant and the Export Plant result from ores taken from the Mine and

processed by W.R. Grace at each of the two facilities. The responsibility for their generation and current placement lies squarely with W.R. Grace. Rather than spread responsibility for long-term care of these materials to others, it is appropriate to leave such responsibility to W.R. Grace by returning the materials to the place from which they came.

f. Efficacy of Disposal The characteristics of the Mine, such as its on-site location, its remoteness from human populations and its topography, make the Mine a safe, long-term disposal location.

21. The EPA also needs access to the Mine property in order to oversee W.R. Grace's response actions associated with the Export Plant (i.e.- its use of the Mine as a disposal location, which has been verified by W.R. Grace's actual disposal of Export Plant wastes at the Mine) as required by Unilateral Administrative Order ("UAO"), Docket # CERCLA 8-2000-10, issued May 23, 2000, Paragraph 4. EPA has committed to the people of Libby, and is obligated pursuant to CERCLA and the NCP, to ensure that W.R. Grace conduct its actions pursuant to the UAO in a safe and environmentally sound manner. Thus, EPA must be able to observe, sample, and direct response activities at anytime during the pendency of the UAO. Finally, on August 28, 2000, W.R. Grace provided EPA access to the Mine to perform only oversight activities.

22. Before being denied access to the Mine, the EPA and MDEQ were investigating the scope of needed response actions at the Mine and its associated roads. While it is not in question that these areas are heavily contaminated with amphibole asbestos, it is not yet clear what level of response is necessary, as the surrounding area is only used for logging and recreation, thus presenting more limited exposure scenarios than the Export or Screening Plants. EPA therefore

needs access to conduct air, soil, sediment, and water sampling to completely assess these threats, and to subsequently carry out any response actions that these investigations indicate are needed.

23. The EPA has determined that there are high levels of amphibole asbestos contamination on all of the KDC parcels associated with the former Screening Plant. As indicated in the Action Memorandum, cleanup is necessary at these parcels. When denied access, EPA was completing the final surveying and sampling of the properties to identify the specific areas to be cleaned up. In addition, the EPA had contracted with an archeologist to investigate the cultural resources associated with a prehistoric Native American encampment located on the Screening Plant, as required by the Historic Preservation Act and the Cultural Resource Protection Act. Therefore, EPA needs access to the KDC parcels to complete its archeological assessment, to complete the sampling and surveying already started, and to conduct its clean-up actions. This includes access to the KDC land in the area of the Wise and Parker properties, and the KDC land across the Kootenai River just above the former rail loading operation associated with the Screening Plant.

24. The overall goals of all the above described actions are to investigate and identify all areas where the public may be exposed to unacceptable levels of amphibole asbestos, and to take appropriate response actions to eliminate or minimize these unacceptable exposures where they occur. The EPA wishes to accomplish these goals in an expeditious, and cost-effective fashion.

25. On July 19, 2000 Ms. Land transmitted to W.R. Grace a letter requesting access to all properties owned by KDC, including the Mine Site, for the purposes of sampling, investigations, and taking of response actions. In addition, the letter requested access at the Mine Site for the purpose of disposing of contaminated materials from the W.R. Grace's former Screening Plant.

26. On July 20, 2000 Mr. Kenneth Lund of Holmes, Roberts & Owen, acting as outside counsel for W.R. Grace, transmitted to EPA a letter denying all such access. Mr. Lund indicated that EPA would have to agree to multiple conditions to obtain access, including compensation and indemnification. Pursuant to 40 C.F.R. § 300.400(d)(4)(i), EPA may seek enforcement of its access request where such conditions are demanded. It is interesting to note that with the exception of the request for access for disposal of contaminated materials at the Mine, the access agreement is the same one signed by over one hundred residential and commercial landowners in Libby. While W.R. Grace is responsible for the contamination at issue, it requests more "safeguards" for its cooperation than those requested by or provided to those who had no role in the creation of this situation.

27. On July 28, 2000, W.R. Grace submitted a revised Work Plan for the Clean-up of the Export Plant. In this Work Plan W.R. Grace designates the Mine as the selected disposal location for the amphibole contaminated soil and debris removed from the Export Plant.

28. I have personal knowledge of EPA's subsequent efforts to obtain access to the portions of the Site owned and/or controlled by W.R. Grace or KDC. As I understand these efforts are described in a declaration prepared by Kelcey Land, I am not discussing them here.

29. Had EPA had continued access to the KDC properties since it was first provided by KDC, I estimate that all asbestos-contaminated soils would have been removed from the Screening Plant in October, 2000. Due to W.R. Grace's refusal to consent to access, EPA has not been able to remove contaminated soils from the KDC-owned portions of the Screening Plant. In addition, EPA is staging soils removed from other Screening Plant locations until access to the Mine for disposal is resolved. As it will be difficult to perform work at the Site in winter months,

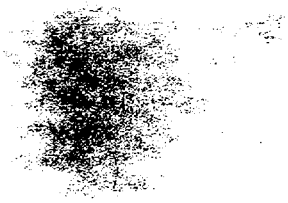
I estimate that EPA will not complete this removal action until June, 2001. The delays caused by W.R. Grace's refusal to consent to access are increasing both the cost of the removal and the likelihood for further human exposure to asbestos fibers.

PAUL R. PERONARD

8 Sept 2000
Date

Declaration of Paul R. Peronard

Attachment 1



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
999 18TH STREET - SUITE 500
DENVER, CO 80202-2466

MAY 23 2000

Ref: 8EPR-ER

ACTION MEMORANDUM

SUBJECT: Request for a Time Critical Removal Action Approval and Exemption from the 12-month, $2-million Statutory Limit at the Libby Asbestos Site-Export Plant & Screening Plant former Processing Areas, Libby, Lincoln County, Montana.

FROM: Paul Peronard, On-Scene Coordinator
Emergency Response Team

THROUGH: Steve D. Hawthorn, Supervisor
Emergency Response Unit

Douglas M. Skie, Director
Preparedness, Assessment & Emergency Response Programs

TO: Max H. Dodson, Assistant Regional Administrator
Office of Ecosystems Protection & Remediation

Site ID#: BC

Category of Removal: Time Critical

I. PURPOSE

The purpose of this ACTION MEMORANDUM is to request and document approval of the Removal Action described herein for two portions of the **Libby Asbestos Site (Site), the Export Plant and the Screening Plant** located in Libby, Lincoln County, Montana. In addition, this document shall serve as the request and documentation of approval of an exemption from the $2 million and 12-month statutory limits.

This Removal Action addresses the need to mitigate the threats to the local population and the environment posed by fibrous form amphibole asbestos into the environment during the extraction and processing of vermiculite ore. High concentrations of asbestos posing a health threat have been detected at two former vermiculite processing plants located in Libby: the Screening Plant and the Export Plant.

Peronard Declaration
Attachment 1

The proposed Removal Action will address immediate threats identified during EPA's first round of sampling in Libby which occurred from December 1999 through April 2000. EPA plans to conduct further evaluation of the results from sampling of 121 homes, as well as six Libby school buildings, other potential source areas, and various other businesses in Libby. This subsequent sampling, analysis and evaluation may identify additional time critical threats at the Site.

II. SITE CONDITIONS AND BACKGROUND

A. Site Description

Vermiculite was discovered just outside Libby, Montana, in 1881 by gold miners. In the early 1920's initial mining operations were begun by Mr. Edward Alley on the vermiculite ore body located approximately 7 miles northeast of Libby (Figure 1). Full scale operations began later that decade under the name of the Universal Zonolite Insulation Company (Zonolite). This ore body also contained amphibole asbestos fibers of the tremolite-actinolite-richterite-winchite solid solution series (herein referred to as amphibole asbestos) (Bureau of Mines Monograph, 1928). Unlike, the commercially exploited chrysotile asbestos, the tremolite-actinolite material has never been used commercially on a wide scale, and for most of the mine's operating life was considered a contaminant. The commercially exploited vermiculite was used in a variety of insulation products and construction materials, as a carrier for fertilizer and other agricultural chemicals, and as a soil conditioner.

Operations at the mine were fairly simple. The ore was strip mined using conventional equipment and then processed in an on-site dry mill to remove waste rock and overburden. Once beneficiated, the processed ore was trucked down Rainey Creek Road to a screening plant, which separated the milled ore into five size ranges for use in various products. From there, the material was shipped across the country, predominantly by rail, for either direct inclusion in products, or for expansion (also known as exfoliation) prior to use in products. Expansion was accomplished by heating the ore, usually in a dry kiln, to approximately 2000 °F, which boiled the water trapped in the crystalline matrix of the vermiculite, thus expanding the material by a factor of 10 to 15 fold.

In Libby, operations handling this material occurred at four main locations: the Mine and Mill located on Rainey Creek Road on top of Zonolite Mountain; the Screening Plant and Railroad Loading Station located astride the Kootenai River at the intersection of Rainy Creek Road and Highway 37 (the Screening Plant); the Expansion/Export Plant (the Export Plant) located off Highway 37 where it crosses the Kootenai River; and an Expansion Plant located at the end of Lincoln Road, near 5th Street (Figure 2). The Lincoln Road Expansion Plant apparently went off line sometime in the 1950's, and has

since been demolished. Investigations are underway to determine the exact location of this facility.

In 1963, the W.R. Grace Company (Grace) purchased Zonolite and continued operations in a similar fashion. A wet milling process was added to the operation in 1975, which operated in tandem with the dry mill, until the dry mill was taken off line in 1985. Expansion operations at the Export Plant ceased in Libby sometime prior to 1981, although this area was still used to bag and export milled ore until mining operations were stopped in 1990. Before the mine closed in 1990, Libby produced about 80% of the world's supply of vermiculite.

1. Physical location

The Site is located in Montana, within Sections 3 and 10, T.30N.,R.31W. of the Libby Quadrangle, in the county of Lincoln. (See Figure 1). The Export Plant occupies approximately 11 acres of property which is now owned by the City of Libby, and leased to a retail lumberyard (Figure 2). Some amphibole asbestos contamination has been found on adjacent parcels of land which had been used as youth baseball fields, but are now unused. During operations the screened ore was trucked from the Screening Plant to the Export Plant, and staged with various other vermiculite related materials between the ballfields and the Export Plant, and in a few other outlying areas. All of these areas are considered part of the Export Plant for purposes of this Action Memo.

Currently, the Export Plant is used as a retail lumber mill. Its main features are five buildings used to house finished and rough lumber, and other construction related materials. These buildings also contain various milling equipment, tools, and a retail center. The buildings are all of basic wood construction. The Export Plant has paved access to Highway 37, and part of the property is now being used as a laydown area in support of improvements to the Highway 37 Bridge across the Kootenai River.

The Screening Plant occupies approximately 21 acres of property which is now used for combined commercial/residential use. It is likely that amphibole asbestos contamination has spread to the parcels of land (zoned residential) to the west and south of the Screening Plant proper. During operations the screened ore was moved by conveyor belt across the Kootenai River to a rail loading operation adjacent to a Burlington-Northern Rail Line. Amphibole asbestos contamination has also been found in this area. All of these areas are considered part of the Screening Plant for purposes of this Action Memo.

Currently, the Screening Plant is used as a wholesale nursery; a covered storage facility for recreational vehicles, motor boats, and other equipment; and a farm for medicinal mushrooms. It is also the location of the primary residence for the current property owners and is frequently visited by relatives, including their children and young grandchildren. Its main features are the residence (former lab/office building); an approximately one acre, 40' high storage building; several green houses; a series of concrete tunnels that house the mushroom farm, and are also used for storage; several smaller storage units; a tree orchard; and a planting operation.

2. Removal Site evaluation

In response to local concerns and news articles, an Environmental Protection Agency (EPA) Response Team, conducted an initial site visit on November 23, 1999. The initial investigation consisted of the following: a brief inspection of the former mine and processing facilities; interviews with local officials and some members of impacted families; an interview with a pulmonologist in Spokane, Washington who specializes in the treatment of asbestos related diseases; and the collection of a small set of environmental samples.

This investigation revealed two important findings. First, there are a large number of current and historic cases of asbestos related diseases centered around Libby, Montana. The pulmonologist in Spokane alone was currently treating over 200 cases of asbestos related diseases among people who had either lived in Libby or worked at the mine, and had provided care to dozens more who had already died. Out of this physician's cases were 33 incidents of apparently non-occupational exposures. Of these 33, six had no family or other ties to anyone working at the mine. While anecdotal in nature, these findings suggest definitive health effects from the amphibole asbestos found at Libby.

The second finding was the likelihood that significant amounts of asbestos contaminated vermiculite still remained in and around Libby. It is clear that high concentrations of amphibole asbestos remain in the tailings pile and tailings pond at the former mine itself. In addition, visible piles of unexpanded vermiculite remained at the Screening Plant, and the base material of Rainey Creek Road appeared to contain tailings and sands from the mine. Historic sampling by Grace and the EPA have documented that the beneficiated, but unexpanded ore from the Libby mine contained asbestos concentrations ranging from reported trace to 7% fibrous amphibole asbestos by weight (MRI, 1982 and Grace Data -- Grace data has been reviewed by EPA, but documentation has not yet been provided by Grace to put into the administrative record). Residents described how piles of expanded and

unexpanded vermiculite used to sit at the Export Plant, next to two former youth baseball fields (Figure 2). Children were described as having regularly played in and around these piles. Both expanded and unexpanded vermiculite from waste piles around the mining operations were commonly used by local residents in their yards and gardens as a soil conditioner (Community Interview Summary, ISSI, 2000), and the expanded vermiculite was used as wall and attic insulation in many homes. Descriptions of historic operations of the mine, mill, and processing centers indicated that large amounts of dust and other fugitive emissions were released into the environment when these operations were still running.

These findings led EPA to initiate a larger scale rapid investigation with the following distinct goals:

i. Obtain information on airborne asbestos levels in Libby (a limited number of homes, businesses and the Export Plant and Screening Plant) in order to judge whether time-critical intervention is needed to protect public health.
ii. Obtain data on asbestos levels in potential source materials (at the Export Plant and Screening Plant), and identify the most appropriate analytical methods to screen and quantify asbestos in source material.

In December 1999, the Agency collected samples of air and dust from inside 32 homes and 2 businesses around Libby, and collected samples from yards, gardens, insulation, and driveways at these same locations. In addition, air, dust and soil samples were collected from the Screening Plant and Export Plant. Samples were also collected from along Rainy Creek Road. This was followed by the sampling at an additional 89 residences, area schools and other potential source areas around Libby in March and April 2000. To date, over 2000 samples have been collected. Seasonal sampling of ambient air around Libby and the former mine also began this past January, and will continue monthly, at least through next Fall.

Environmental data collected in Libby since November 23, 1999 clearly indicated the presence of complete pathways of exposure between residents and hazardous types of asbestos fiber. Asbestos is of potential concern because chronic inhalation exposure to excessive levels of asbestos fibers suspended in air can result in lung disease such as asbestosis, mesothelioma, and lung cancer. Subacute exposures as short as a few days have been shown to cause mesothelioma. Exposures via ingestion and dermal contact are considered to be of lesser concern. Therefore, as its first priority, EPA analyzed the air samples collected during the December, 1999 sampling effort. Characteristics of airborne amphibole asbestos were found to be in the *range of concern - i.e., fibers greater than 5 microns in length and having an aspect ratio of greater than 5 to 1* inside 4 of the 32 homes (3 with amphibole

fibers, one with chrysotile fibers). These fibers were also detected inside buildings (including several open air buildings) at the Export Plant and Screening Plant. Shorter amphibole asbestos fibers, i.e. less than 5 microns in length, were detected in roughly 30% of the indoor air and dust samples collected during this round. High concentrations, ranging up to 10% by weight, were also detected in soils from these two processing facilities. At the Screening Plant dust measurements showed numerous amphibole asbestos fibers greater than 5 microns in length and having an aspect ratio of greater than 5 to 1 (see Attachment 1 - Summary of Asbestos Measurements, and Figure 3 and Figure 4 - Asbestos Levels in Soils by PLM).

The samples from the remainder of the 34 homes/locations do not initially indicate an immediate concern, but the finding of the shorter amphibole asbestos fibers in air samples, as well as the indication that there is some asbestos content in yards and gardens around Libby is somewhat troubling. This information provides evidence of widespread fiber distribution in Libby and the possibility of complete exposure pathways for residents. Further analyses, with more refined analytical techniques are necessary to evaluate these issues, and are underway. Additionally, more sampling and analysis is necessary in the additional 89 homes tested in March and April, and of ambient air around Libby and the mine area of the Site. EPA will also investigate all potential source areas identified by local residents and through research.

3. Site characteristics

The population of Libby and surrounding communities located within a four-mile radius is estimated at 13,800. The principal industries in the area consist of lumber production, mining, and summer tourism. The topography is mountainous with pronounced river valleys. Libby and the surrounding area are subject to significant weather inversions.

The economy of Libby is somewhat depressed and the community has a high unemployment rate. Many of the homes tested by EPA are in need of repair, with obvious gaps in drywall where vermiculite insulation can enter the living space. Lawns are typically not sodded and exposed, unvegetated areas are common.

4. Release or threatened release into the environment of a hazardous substance, or pollutant or contaminant

Asbestos is a hazardous substance as defined by 40 CFR Section 302.4 of the NCP. During operation of the mine and related processing facilities, residents reported that large amounts of dust and fugitive emissions were released into the environment. The solid-solution series of tremolite-actinolite-richterite- winchite (referred to as

amphibole asbestos in this Action Memo) are present in the fibrous habit throughout the areas of concern for this Action Memo. Residents describe having to halt baseball games as large dust clouds swept through the ballfield area from the piles of vermiculite at the Export Plant. Data collected by W.R. Grace in 1975 shows levels of airborne asbestos in downtown Libby of 1.5 fibers/cubic centimeter (cc), over 10 times the current NIOSH, OSHA and ACGIH occupational limits of 0.1 fibers/cc (Eshenbach Deposition, Exhibit 182.126). Data collected by a contractor to EPA in the1980's measured airborne asbestos levels at 0.5 fibers/cubic centimeter (cc), five times higher than today's occupational limits, 4.5 miles from the mine site (MRI, 1982). The contaminated dust and soil created by these fugitive emissions likely remains in the environment and can be re-entrained leading to inhalation exposures. There is extensive literature indicating that at various times workers at the mine site, mill and processing facilities were exposed to high levels of asbestos from fugitive dust emissions (Amandus, 1987; MacDonald,1986). Other environmental releases of asbestos occurred from workers bringing home dust covered clothing and personal vehicles. It is known that asbestos fibers accumulate in indoor environments, and re-entrainment of indoor fibers can multiply indoor ambient air levels 50-fold (Sabastien, 1979).

Recent sampling conducted by EPA's removal program in December 1999 through April 2000 detected amphibole asbestos fibers at concentrations of concern in indoor air samples collected at the Screening Plant and at the Export Plant. These sample results indicate an on-going risk to workers and residents at and near these locations. The Screening Plant is now a primary residence and nursery business with two main occupants. In addition the residents have regular visits from their children and grandchildren, who all have been observed working and playing in the asbestos contaminated vermiculite. In addition to the current nursery workforce (6 to 20 workers, depending on the season), the Screening Plant has regular visits by people storing recreational vehicles on the property, or who have business with the nursery. The Export Plant is owned by the City of Libby but is leased by a lumber yard employing several individuals. The Export Plant is located adjacent to a large open field that was formerly used as two baseball fields. Access to the area is unrestricted during non-business hours.

Air samples were collected inside each of the main buildings at the Export Plant and Screening Plant. The samples were analyzed using transmission electron microscopy (TEM) which allows fibers to be distinguished both by type and by size. The concentrations of amphibole asbestos fibers greater than 5 microns and with an aspect ratio greater than 5:1 detected at each of these facilities are reported in the Attachment 1.

In addition to significant air concentrations, soils at the Screening Plant and the Export Plant contained high levels of amphibole asbestos which can act as a

continuing source of exposure to individuals working and living at the properties. At the Screening Plant, amphibole asbestos was detected using polarized light microscopy (PLM) in 84 of 102 samples collected, with 18 samples containing asbestos at or above 2% by weight and one sample as high as 4% asbestos. Also at the Screening Plant, rocks containing high concentrations of fibrous form amphibole asbestos have been uncovered. These rocks come from the mine area of the Site, and apparently have been used as backfill in a few locations at the Screening Plant. These very friable materials are reported to be a favorite throwing stone among the grandchildren.

Similarly, at the Export Plant, 76 out of 109 samples contained detectable levels of amphibole asbestos by PLM, with 17 samples containing asbestos at or greater than 2%, and one sample measuring 10%. At both properties, pockets of unexpanded and expanded vermiculite are visible at the surface in many locations.

It should be noted that all the laboratories used to do this analysis reported some difficulty in reading the samples due to the matrix and the long thin nature of the amphibole asbestos. All labs indicated that they were likely under reporting asbestos concentrations. Because of this the Region is currently developing a Scanning Electron Microscope (SEM) analysis which should overcome these reported difficulties, and more accurately report asbestos concentrations. Preliminary results of the SEM investigation indicate the widespread presence of amphibole asbestos fibers in all samples observed, including those that were reported as non-detect by PLM. Additional dust samples collected from window sills in the main residence and from several areas in the Long Shed at the Screening Plant, show abundant long, thin amphibole asbestos fibers when analyzed by SEM. Visible dust accumulations are prevalent in all of the buildings at the Screening Plant and the Export Plant.

5. NPL status

The Site is currently not on the National Priorities List (NPL). EPA has not yet made a decision regarding NPL listing for the Site.

B. Other Actions to Date

1. Previous actions

There have been no previous Removal Actions at this Site. EPA Region 8's air program was previously involved in an asbestos NESHAPS violation case, but no previous CERCLA activities have been performed.

2. Current actions

Besides the sampling and activities which have already been described, a *Community Advisory Group* (CAG) has been formed. This group contains representatives from many diverse interests in Libby. The CAG will provide a forum for community residents to review documents, hear and make presentations, express concerns, and make recommendations. EPA, the Agency for Toxic Substances and Disease Registry (ATSDR), and the Montana Department of Environmental Quality (MDEQ) will provide technical and administrative support to the CAG.

EPA is also developing a *Community Involvement Plan* (CIP) to help guide the interaction and involvement of the citizens and officials of Libby. A voluntary medical testing and exposure assessment involving radiological testing and pulmonary function tests are being planned for the immediate future in coordination with ATSDR and the Montana Department of Public Health and Human Services.

C. State and Local Authorities' Roles

EPA became involved at the Site in response to requests from the State of Montana, Lincoln County Health Board (meeting of 11/23/99), and City officials of Libby, who asked that EPA address questions and concerns by citizens regarding possible ongoing exposure to asbestos fibers as a result of historical mining, processing, and exportation of asbestos-containing vermiculite. Both State and local agencies are very involved in providing input into the goals, objectives and implementation of the site investigations. MDEQ has assigned a project manager who is fully engaged in the design and implementation of the investigations and the actions proposed herein. However, neither the State nor local agencies have the needed resources to conduct the needed site investigations or clean-ups independently.

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

A. Threats to Public Health or Welfare

The threat of exposure to workers and residents exists through inhalation of amphibole asbestos at the two former vermiculite processing facilities, the Screening Plant and the Export Plant. The conditions at the Site present an imminent and substantial threat to human health and the environment and meet the criteria for initiating a Removal Action under Section 300.415(b)(2) of the NCP. The following factors from §300.415(b)(2) of the NCP form the basis for EPA's determination of the threat presented, and the appropriate action to be taken:

(i) *Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances;* The large concentrations of asbestos found at the Screening Plant and Export Plant in all media: soil, dust, and airborne, clearly indicate that the human exposure pathway is complete. In evaluating the threat posed by this exposure there are several factors to consider. The first is a historic review of the effects that have been documented by exposures to similar conditions. The second is construction of an appropriate conceptual risk model to quantitatively estimate current risks.

From a historical perspective, it is clear that exposure to Libby vermiculite ore mining and processing operations has resulted in asbestos related disease and death. Studies by NIOSH researchers at expanding plants (Lockey, 1984) and at the Libby mine (Amandus et. al., 1987), as well as by Grace sponsored investigations (MacDonald, 1987) clearly show the deleterious health effects to people who were exposed to fibers from this ore. In addition, the Public Health Service (PHS) and ATSDR are in the beginning stages of the development of a full case series/epidemiological evaluation of facilities that processed Libby vermiculite ore, both in Libby, and around the country. So far, they have discovered documented medical cases that appear to have as the primary source of exposure contact with unexpanded vermiculite in non-occupational settings. The concentrations of amphibole asbestos found at the Screening Plant and the Export Plant are very similar to those that have been reported in unexpanded vermiculite historically.

It is also evident that direct contact with this material would tend to generate significant airborne fiber concentrations. Grace data from various job categories associated with handling and moving the vermiculite ore range up to over 120 fibers/cc (Amandus et. al, 1987). EPA also saw evidence of bulk materials generating airborne fibers in results of aggressive sampling conducted at two homes in Libby in December, 1999. Given the number of reported (over 575) and documented (over 200) cases of asbestos related disease and death associated with handling the ore from the Libby mine it is reasonable to conclude that this known and completed exposure pathway is an imminent and substantial threat to public health and welfare. In support of this conclusion the OSC sought and received concurrent opinions from the EPA Regional Toxicologist, the PHS, and ATSDR (see Attachment 2).

With respect to a quantitative estimate of risk posed by measured airborne concentrations at the Export Plant and Screening Plant, EPA's Regional Toxicologist detailed his findings in Attachment 2.

Both the Export Plant and Screening Plant are no longer used for processing of vermiculite, but are occupied by residents and/or workers who are currently being exposed to these airborne levels or higher. It is worth noting that at both locations

normal work activities were curtailed in order to accommodate the EPA's sampling activities, and that the sampling was conducted on fairly wet, winter days which would tend to suppress airborne fiber concentrations leading to conservative results. The Screening Plant is now a primary residence for two individuals, plus receives frequent visits from family members, and its on-going nursery business employs several full-time workers when in operation. The Export Plant is owned by the City of Libby, but is leased by a commercial lumber yard. It employs several individuals and receives a fair amount of retail traffic. The Export Plant is located adjacent to a large open field that was formerly used for two baseball fields. Access to the area is unrestricted during non-business hours.

(iii) *Hazardous substances or pollutants or contaminants in drums, barrels, tanks, or other bulk storage containers that may pose a threat of release;* At the Export Plant there is bulk storage of vermiculite in small piles inside and outside of various buildings on the property. In addition, there appears to be a large pit containing asbestos contaminated vermiculite adjacent to the main retail building on the property. The owners and their employees come into frequent contact with these storage piles.

At the Screening Plant there are over 3000 three gallon buckets of unexpanded Libby vermiculite that are being used as part of the mushroom farm. In addition there is bulk storage of vermiculite in piles inside and outside of various buildings on the property. There are approximately 2 tons of unexpanded vermiculite and expanded vermiculite stacked in deteriorating bags at the property. At the Screening Plant the owners and/or their family members or employees come into near daily contact with these materials and the amphibole asbestos they contain.

(iv) *High levels of hazardous substances in soils largely at or near the surface, that may migrate;* Vermiculite (expanded and unexpanded) is visible at the surface at both the Screening Plant and Export Plant. Surface soils at both the Screening Plant and Export Plant contain high measured asbestos levels scattered widely over the surface of the properties. There are several pathways by which these asbestos fibers can become entrained in air leading to inhalation exposures, both on and off the Screening Plant or Export Plant properties. Contaminated soils can easily be tracked into buildings or off the Plant properties by truck, automobile, equipment, and/or pedestrian traffic; and then through normal activities, such as vacuuming or other air disturbance, become respirable dust. Wind, particularly in dry summer months, can lead to the migration of fine asbestos fibers from contaminated soils. Rainfall and snow melt would also tend to wash the fibers off of the Export and Screening Plants onto neighboring parcels, or into the Kootenai River. In addition, there is documentation that in the past, area residents would remove in bulk expanded and unexpanded vermiculite that had been abandoned by Grace at the two processing centers. This has resulted in the contamination of yards, driveways, and gardens with amphibole asbestos in the Libby area. Since there still remain piles,

pits, and other containers of unexpanded vermiculite at both the Screening Plant and the Export Plant this is still a potential pathway for exposure.

Currently EPA has not established, under any of its regulatory programs, an asbestos level in soil below which an exposure does not pose a risk. The 1% cut-off level for regulation under the Toxic Substances Control Act abatement program was established on the basis of analytical capability at the time, and was not established based on the level of risk represented. To the contrary, at Superfund sites in California EPA Region IX found in certain settings that concentrations of asbestos less than 1% posed unacceptable inhalation risks when subject to disturbance by traffic (EPA, 1994)

(v) *Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released*; The hotter temperatures and dry weather typical in the summer months in Libby will contribute to the migration of asbestos containing soils. As soils dry out they are more likely to be transported by wind, causing the asbestos to become airborne and available for inhalation. In the spring time snow melt, rainfall, or other forms of run-off inducing events will tend to spread the contamination further. In addition, because of the mountain/river bottom topography of the area, Libby is subject to severe and persistent inversion patterns, so entrained airborne contaminants remain in the area for longer periods of time.

(vii) *The (lack of) availability of other appropriate federal or state mechanisms to respond to the release*; No other Local, State, or Federal agency is in the position or has the resources to independently implement an effective response action to address the on-going threats presented at the site. EPA will conduct its actions in concert with State and Local authorities.

B. Threats to the Environment

The Site investigation has not proceeded far enough to know if the asbestos contamination is a threat to animals, water, and other parts of the environment. Asbestos is primarily a threat to human health. Nonetheless, the Agency has been requested to evaluate the potential effects that the mine and processing facilities have, or have had on environmental receptors in the area. It is suspected that the actions described herein for the Screening Plant and for the Export Plant, will address any potential environmental threats at these two facilities.

IV. ENDANGERMENT DETERMINATION

Asbestos is a generic term for a group of six naturally-occurring fibrous silicate minerals. The predominant fibrous habit of minerals found at the Libby Site are of the tremolite-actinolite solid solution series (referred to in this Action Memo as amphibole asbestos). Asbestos can cause asbestosis and is a recognized human carcinogen, causing lung cancer and mesothelioma, a lethal

neoplasm of the lining of the chest and abdominal cavities. All of these asbestos related diseases have been found, to an unprecedented extent among former mine workers, their families, and to nearby residents with no known occupational or familial connection to the vermiculite mining and processing operations in Libby. Cancer of the larynx and esophageal lining has also been associated with exposure to asbestos. Commercial forms of asbestos have been found to be carcinogenic in experimental animals.

Actual or threatened releases of asbestos from this Site, if not addressed by implementing the response action selected in this Action Memorandum, present an imminent and substantial endangerment to public health, welfare, and the environment.

V. EXEMPTION FROM STATUTORY LIMITS

A. Emergency Exemption:

Site conditions meet the criteria set forth in CERCLA §104(c)(1)(A) [40 CFR 300.415 (b)(5)(i) of the NCP]. It should be noted that this exemption is being requested for response actions proposed at both the Screening Plant and the Export Plant as additive removal actions at the Libby Asbestos Site. Removal Action expenditures will be tracked cumulatively against a single, total Site ceiling. Any subsequent actions deemed necessary as of the result of the on-going investigations in Libby will be documented in additional Action Memorandum(s), and will be considered covered by this exemption request, and tracked in a likewise, cumulative fashion.

1. There is an immediate threat to the local population posed by the amphibole asbestos released to the environment. If action is not taken at the Screening Plant and Export Plant, individuals living and working on these properties will continue to be exposed to hazardous mineral fibers. Non-enclosed buildings at both facilities contain significant amounts of dust containing asbestos fibers of the length and type of concern. This dust is easily disturbed leading to additional potential inhalation exposures. Surface soils at each property contain in excess of 2% asbestos by weight. These soils are subject to disturbance by wind, tracking through and off the property by human activities, and migration from potential new development and construction which can give rise to additional exposure to asbestos fibers. Subsequent inhalation of these fibers by workers, visitors and on-site residents could cause an immediate public health threat. Inhalation of asbestos fibers is known to cause three major respiratory diseases: asbestosis, lung cancer and mesothelioma. Asbestosis is a disease characterized by fibrotic scarring of the lung and is caused specifically by exposure to asbestos mineral fibers. Mesothelioma is a cancer of the chest cavity lining. Cases of asbestosis, mesothelioma, and other lung cancers have all been diagnosed by area physicians, and attributed to exposure to the Libby vermiculite processing operations and ore.

The exposure pathways at both the Export Plant and Screening Plant are known and complete. Given, the documented death and illnesses associated with similar exposure circumstances to the hazardous substances found in the Libby vermiculite, it is imperative that these actions be undertaken and completed in a timely manner.

2. Continued response actions are required to prevent, limit, or mitigate an emergency. If the request for a 12-month, $2 million statutory exemption is not granted, the Removal Action will not be able to proceed to completion. Total costs of both Removal Actions (combined Screening Plant and Export Plant costs) are anticipated to exceed $2 million due to the large size of the properties, the extensive amount of soil contamination, the need to temporarily relocate a residence at the Screening Plant and a business at the Export Plant, the difficulty in removing asbestos containing dust and fibers from buildings on each of the properties, the probable need to demolish some or all of the buildings, and extensive restoration needs. Given the short construction season in this mountainous part of northwest Montana (May-September), it is likely that some restoration activities (e.g, re-vegetation, building reconstruction) will carry over into the spring/summer of 2001. If the removal actions are not completed asbestos will continue to migrate from the two properties and residents and workers will continue to be exposed to airborne asbestos fibers.

3. Assistance from other government agencies is not anticipated on a timely basis for these Removal Actions. Neither the State nor the County has the response capabilities or resources to take any actions independently at the Site. No other mitigation actions are expected to occur to abate the threats described in this action memo. Consequently, the timely completion of this Removal Action can only be accomplished if this combined Removal Action and 12-month exemption and $2 million request is approved.

VI. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Actions

1. Proposed action description

To mitigate the threat to the public health and welfare or the environment posed by the asbestos present on the Screening Plant and the Export Plant, the proposed removal actions are outlined below. A more detailed Scope of Work for these projects is being developed with the assistance of the Department of Transportation -Volpe Engineering Center (DOT-Volpe), in conjunction with MDEQ. The removal will involve the following:

a. Temporary relocation of on-site business at the Export Plant and on-site residence at the Screening Plant
b. Preparation of Site property (e.g.-power, access roads, etc.)
c. Demolition/cleaning of contaminated buildings and structures - buildings will be assessed on a case-by-case basis to determine if decontamination is technically feasible and cost effective. It is anticipated that many of the buildings can not be adequately or cost effectively decontaminated due to the extensive amount of asbestos dust which has infiltrated into porous surfaces.
d. Excavation of contaminated soil, debris, and vermiculite
e. Preparation of disposal location at the mine, or other appropriate disposal location
f. Transportation and disposal of waste
g. Property restoration

In accordance with Section 300.415(l), EPA will pursue appropriate arrangements for post-removal site controls at the disposal site to ensure the long-term integrity of the removal.

2. Contribution to remedial performance

EPA has not yet made a decision regarding NPL listing for the Site. The proposed removal actions should compliment and contribute to the overall success of any remedial actions in the future.

3. Description of alternative technologies

No alternative technologies were found to be appropriate given the nature of the asbestos contamination, the scope of the project, and its time critical nature. If in the course of these, or any subsequent removal actions at the Site, any alternative remediation technologies are identified that will enhance response actions, they will be considered as appropriate.

4. EE/CA

This is a Time-Critical Removal Action; thus, an EE/CA is not required.

5. Applicable or relevant and appropriate requirements

As this Action is being conducted as a Time Critical Removal Action, all Federal and State ARARs may not have been identified at this time. The ARARs identified to date are provided as Attachment 3. In accordance with the NCP, all ARARs for the Site will be attained to the extent practicable, given the scope of the project and the urgency of the situation as they are identified.

Many of the ARARS identified for these Removal Actions come from the Clean Air Act National Emission Standards for Hazardous Pollutants (NESHAPS) for asbestos. These regulations were designed specifically for renovation and demolition of buildings with asbestos containing material (ACM) such as floor tile, ceiling tile and pipe wrapping. The regulations were not designed for loose fill vermiculite insulation, piles of unexpanded vermiculite, contaminated soils or heavily contaminated dust. As such, it is anticipated that it may not be practicable to achieve all ARARS during these Removal Actions. Additional discussion is found in Attachment 3.

6. Project Schedule

Action Item	Projected Start Date	Planned Completion
1. Site Mobilization	19 May 2000	15 June 2000
2. Relocation of on-site residents	19 May 2000	01 June 2000
3. Preparation of Site property	05 June 2000	19 June 2000
4. Demolition/cleaning of contaminated buildings and structures	19 June 2000	19 July 2000
5. Excavation of contaminated soil, debris, and vermiculite	30 June 2000	30 August 2000
6. Preparation of disposal location	15 June 2000	30 June 2000
7. Transportation and disposal of waste	19 June 2000	26 August 2000
8. Property restoration	15 August 2000	Spring/Summer 2001

B. <u>Estimated Costs</u>

The following cost estimates include costs associated with both removal actions for purposes of creating a total Site ceiling. It is anticipated that the Removal Action for the Export Plant will be done as a PRP lead. These costs are being estimated in the event that the project must be done as a fund lead action. The costs do not include any past or future investigation costs on the Site. These are being tracked separately as well. Costs are projected as follows:

EXTRAMURAL COSTS (All Regional AOAs)		Screening Plant	Export Plant
	A. DOT-Volpe Oversight and Engineering	$ 250,000	$ 100,000
	B. Site Mobilization	100,000	30,000
	C. Relocation of on-site residents/business	80,000	80,000
	D. Preparation of Site property	100,000	5,000
	E. Demolition/cleaning of contaminated buildings and structures	525,000	125,000
	F. Excavation of contaminated soil, debris, and vermiculite	525,000	200,000
	H. Preparation of disposal location at the mine	50,000	20,000
	I. Transportation and disposal of waste (assumes at mine site)	200,000	200,000
	J. Property restoration	1,000,000	300,000
	K. Analytical Support	275,000	275,000
Subtotal Extramural		**$3,105,000**	**$1,325,000**
	20% Contingency	620,000	265,000
Total Extramural		**$3,725,000**	**$1,590,000**
INTRAMURAL COSTS			
	Direct, Including Travel	$ 150,000	$ 100,000
	Indirect	150,000	100,000
Total Intramural		**$ 300,000**	**$ 200,000**
Total Removal Costs		**$4,025,000**	**$1,790,000**
TOTAL SITE CEILING			**$5,815,000**

VII. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

Delayed action will increase public health risks to the local population/environment posed by airborne asbestos fibers.

VIII. OUTSTANDING POLICY ISSUES

Asbestos removals have been completed in Region 8, and around the country at numerous removal sites which were initiated under Section 300.415 of the NCP and in compliance with NESHAPS regulation under 40 CFR Section 61.150. This removal does not set a precedent or constitute a nationally significant issue. However, the Site does raise a series of policy questions that have broad regional and national impact.

IX. ENFORCEMENT

EPA is reviewing the enforcement status of the Site (See Attachment 4).

X. RECOMMENDATION

This decision document represents the selected Removal Action for the Export Plant and Screening Plant which are a portion of the Libby Asbestos Site, located in Libby, Lincoln County, Montana, developed in accordance with CERCLA as amended, and not inconsistent with the NCP. This decision is based on the Administrative Record for the Site.

Conditions at the Site meet the NCP §300.415(b)(2) criteria for a Removal Action, and I recommend your approval. If the PRP conducts the action at the Export Plant then the EPA Site Ceiling will be the costs of the Screening Plant only, approximately $4,0250,000 budgeted with $3,725,000 budgeted out of the Regional Advice of Allowance (AOA). If EPA performs the work at the Export Plant, then the Site Ceiling will be $5,825,000 with $5,350,000 budgeted out of the Regional AOA (including contingency). The requested Site ceiling includes a cost of $1,800,000 for a fund lead action at the Export Plant, with $1,600,000 coming from the Regional AOA (including contingency).

Approve: Max H Dodson Date: 5-23-00

Max H. Dodson
Assistant Regional Administrator
Office of Ecosystems Protection
and Remediation

Disapprove:_____ Date:_____

Max H. Dodson
Assistant Regional Administrator
Office of Ecosystems Protection
and Remediation

Attachments:

Figure 1	-	Site Location Map
Figure 2	-	Screening Plant & Export Plant Location Map
Figure 3	-	Export Plant Asbestos Level in Soils by PLM
Figure 4	-	Screening Plant Asbestos Level in Soils by PLM
Attachment 1	-	Summary of Asbestos Measurements
Attachment 2	-	Toxicologist, PHS, and ATSDR Memos
Attachment 3	-	Applicable or Relevant & Appropriate Requirements
Attachment 4	-	Confidential Enforcement Summary

SUPPLEMENTAL DOCUMENTS

Support/reference documents which may be helpful to the reader and/or have been cited in the report may be found in the Administrative Record File at the Superfund Records Center for Region VIII EPA, 999 18th Street, Denver, Colorado 80202.

Figure 2. Libby, Montana
With Insets of the Export Area
and Loading Facililty

March, 2000

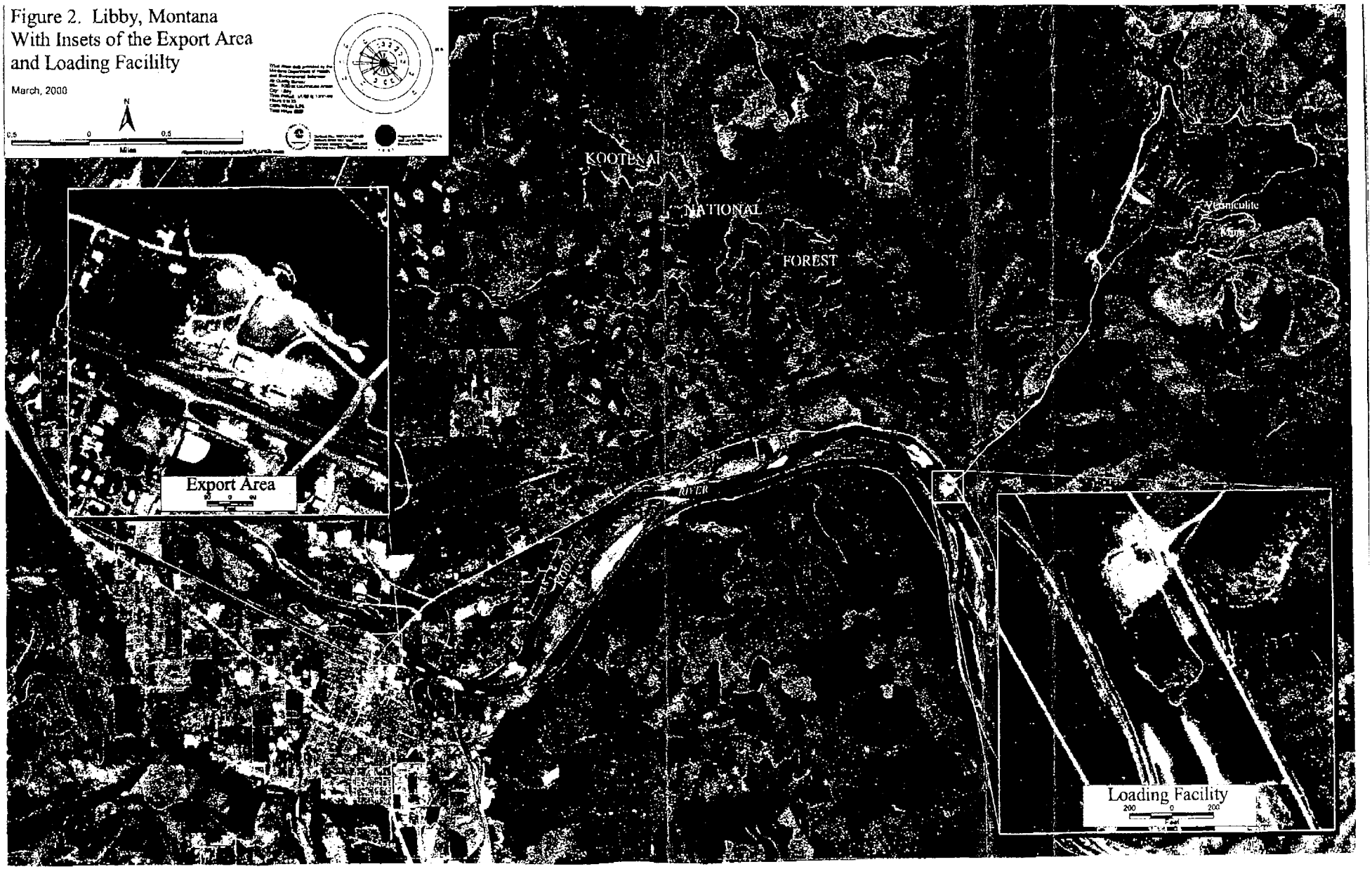
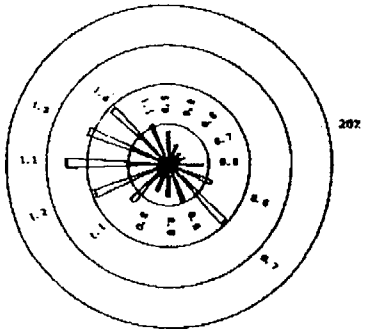
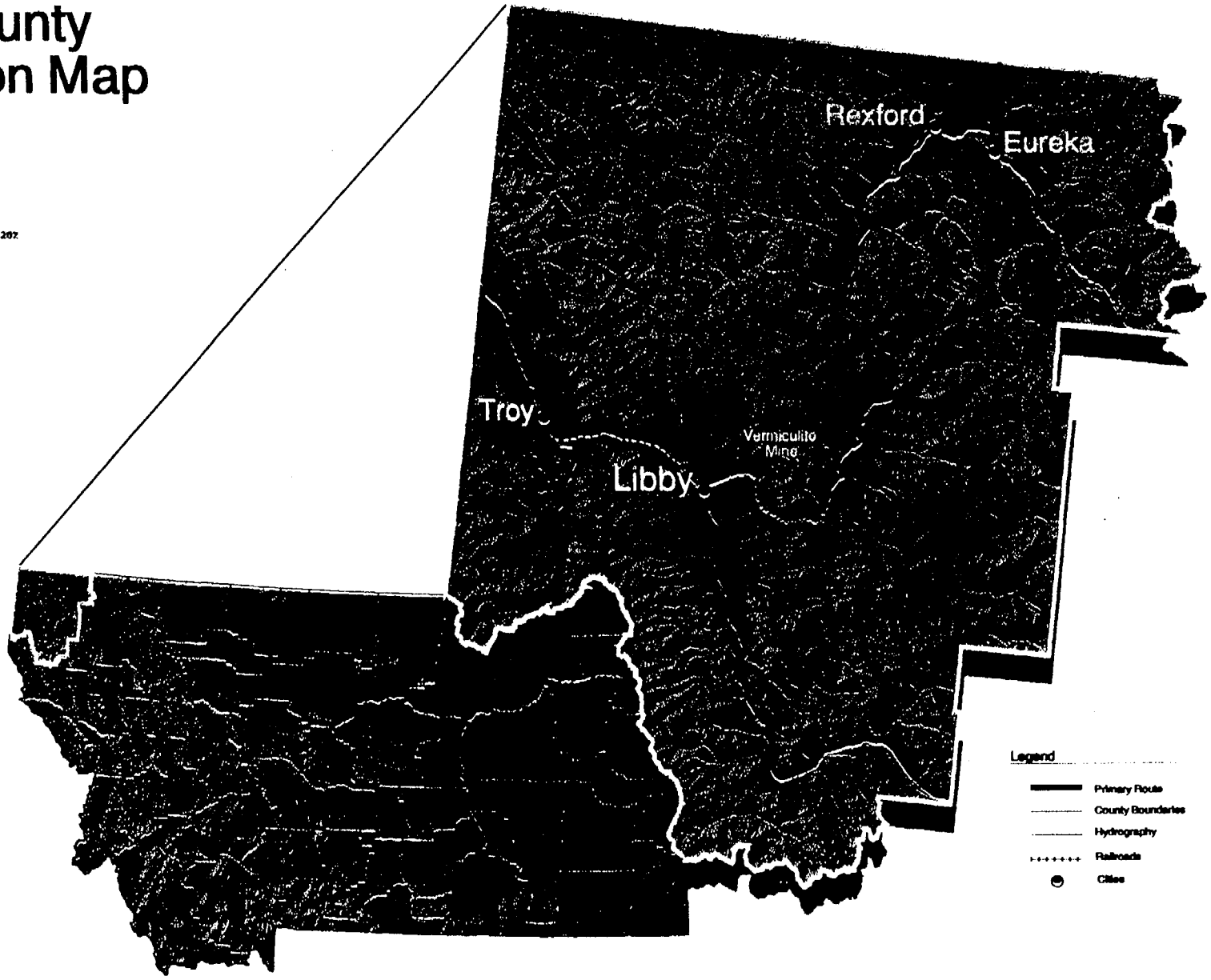


Figure 1. Libby, Montana
Lincoln, County
Site Location Map



Wind Rose data provided by the
Montana Department of Health
and Environmental Sciences
Air Quality Bureau
Site: 900018 Courthouse Annex
City: Libby
Time Period: 1/1/88 to 12/31/88
Hours 0 to 23
Calm Winds 3.3%
Total Hours 5829



Montana Map Scale
50 0 50 100
Miles

Lincoln County Map Scale
4 0 4 8 12 16
Miles

Contract No.: N00174-98-D-8013
Delivery Order No.: 0002
Purchase Request No.: 1003-3N39
EPA IAG No.: DW17993888-01-0

April 25, 2000

r8sun3-/usr1/mwh/projects/images

Prepared for US EPA Region 8 by
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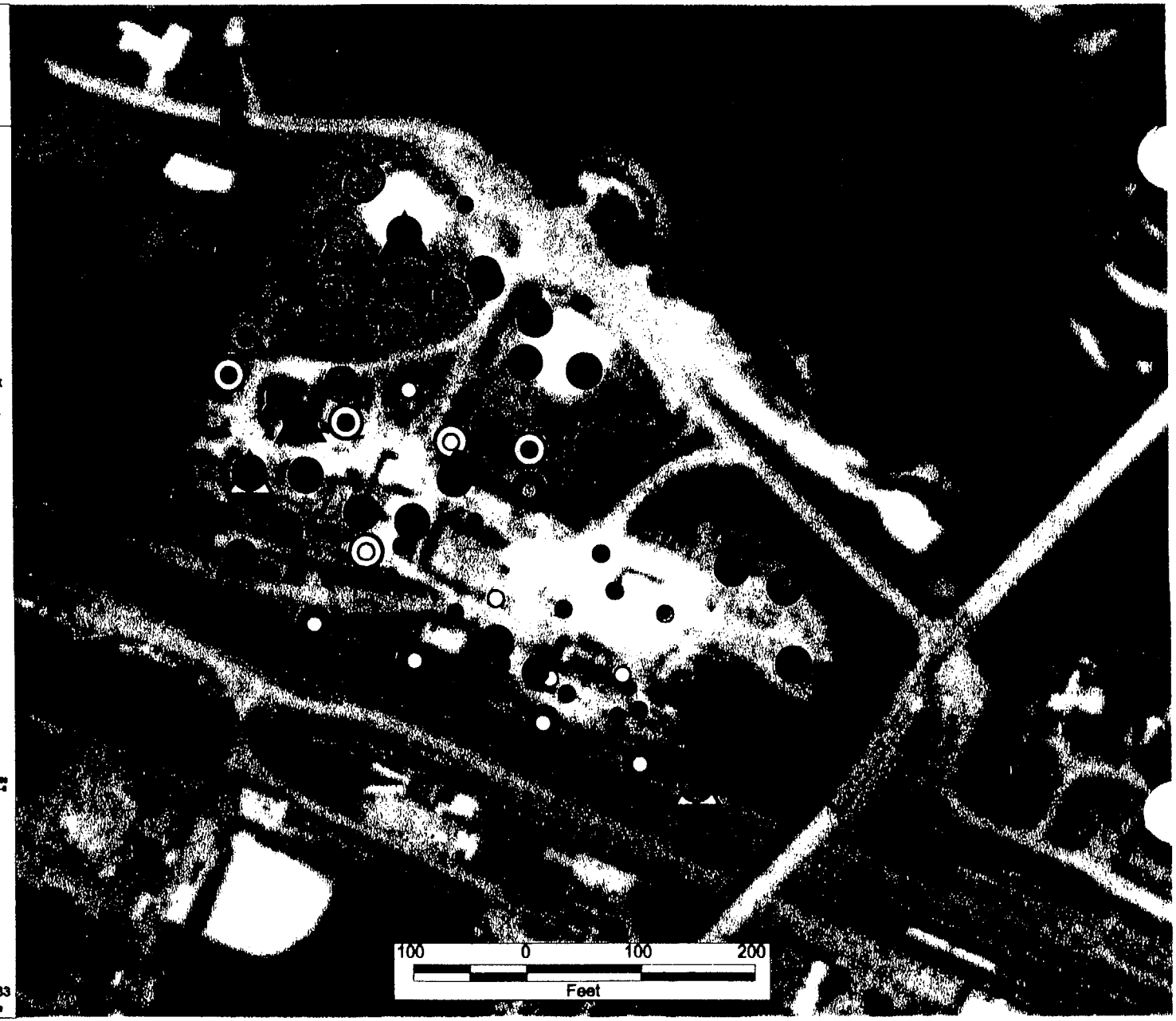
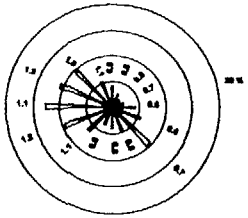
Denver, Colorado 80202

Figure 3. Libby, Montana Export Plant Asbestos Levels In Soil (by PLM)



Surface Samples

- ND
- <1 %
- 1 %
- 2 %
- 3 %
- ≥5 %



Wind Rose data provided by the Montana Department of Health and Environmental Sciences Air Quality Bureau
Site: 900018 Courthouse Annex
City: Libby
Time Period: 1/1/88 to 12/31/88
Hours 0 to 23
Calm Winds 3.3%
Total Hours 5829

Analytical Data and GPS Coordinates Provided by DOT-VOLPE

Depth Samples

- ND
- <1 %
- 1 %
- 2 %
- 3 %
- 4 %
- ≥5 %

Duplicate Samples

- ND
- <1
- 1 %
- 2 %
- 3 %
- 4 %
- ≥5 %

N
W E
S

Contract No.: [illegible]
Delivery Order No.: [illegible]
Purchase Request No.: [illegible]
EPA Work Assignment No.: [illegible]

Prepared for EPA Region 8 by [illegible]
Denver, Colorado

May 16, 2000

Map Projection UTM Zone 11 NAD83

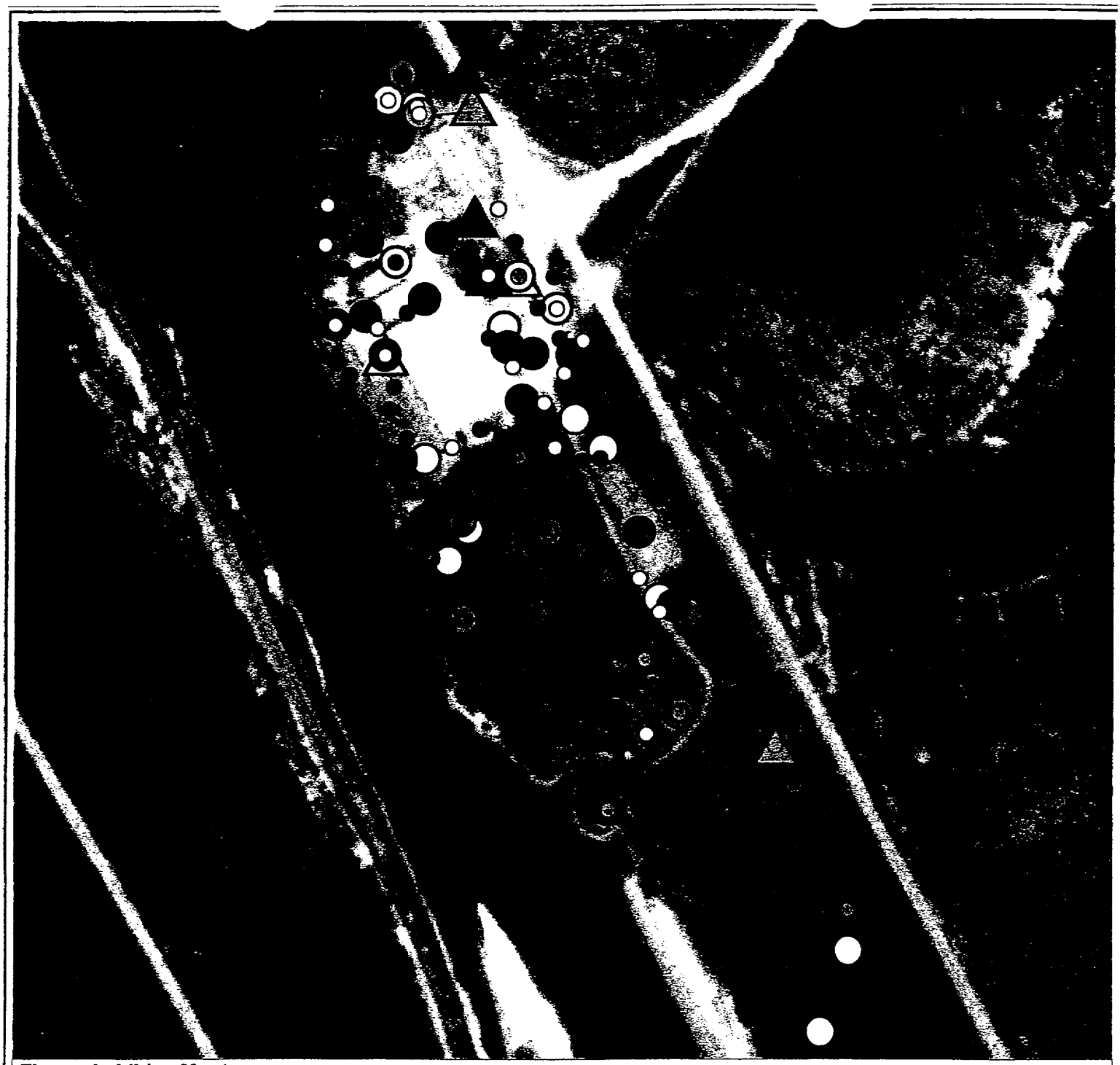


Figure 4. Libby, Montana Screening Plant Asbestos Levels In Soil (by PLM)

Analytical data and GPS coordinates provided by DOT-VOLPE

May 10, 2006

Surface Samples

- ND
- <1 %
- 1 %
- 2 %
- 3 %
- ≥5 %

PLM Results Not Depicted

B00067 1% Tremolite-Actinolite
B00075 1% Tremolite-Actinolite

Depth Samples

- ND
- <1 %
- 1 %
- 2 %
- 3 %
- 4 %
- ≥5 %

Duplicate Samples

- ND
- <1 %
- 1 %
- 2 %
- 3 %
- 4 %
- ≥5 %

Map Projection UTM Zone 11 NAD83

Feet

ATTACHMENT 1

SUMMARY OF ASBESTOS MEASUREMENTS FOR Screening Plant

Table 1: Indoor Air Sampling Results for Screening Plant

Sample Location	Fiber Length (microns)	Asbestos Concentration (Fibers per cubic centimeter)					
		Tremolite/Actinolite Series		Chrysotile		Other Amphiboles	
		Original	Recount	Original	Recount	Original	Recount
Covered Workshop	<5	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
	5 - 10	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
	>10	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
	Other	0.00185	0.00062	Not Detected	Not Detected	Not Detected	Not Detected
Living Room	<5	0.00278	0.00123	Not Detected	Not Detected	0.00278	Not Detected
	5 - 10	0.00093	0.00062	Not Detected	0.00031	0.00093	Not Detected
	>10	Not Detected	0.00062	Not Detected	Not Detected	Not Detected	Not Detected
	Other	0.00463	0.00250	Not Detected	0.00031	Not Detected	Not Detected
Office	<5	0.00185	0.00062	Not Detected	Not Detected	Not Detected	Not Detected
	5 - 10	0.00093	0.00093	Not Detected	Not Detected	Not Detected	Not Detected
	>10	Not Detected	0.00031	Not Detected	Not Detected	Not Detected	Not Detected
	Other	0.00278	0.00093	Not Detected	Not Detected	Not Detected	Not Detected
Mushroom Tunnel	<5	Not Detected	Not Detected	0.00463	0.00154	Not Detected	Not Detected
	5 - 10	0.00093	0.00031	Not Detected	Not Detected	Not Detected	Not Detected
	>10	0.00093	0.00093	Not Detected	Not Detected	Not Detected	Not Detected
	Other	0.00093	0.00031	0.00093	0.00031	Not Detected	Not Detected

SUMMARY OF ASBESTOS MEASUREMENTS FOR Screening Plant

Table 2: Indoor Dust Sampling Results (Fiber Counts) for Screening Plant

Sample Location	Fiber Length (microns)	Number of Fibers Counted	
		Tremolite/Actinolite Series	Chrysotile
REINELL BOAT #MT949AJU	<5	50	1
	5 - 10	12	1
	>10	4	1
	Excluded <5	0	0
	Excluded 5 - 10	0	0
	Excluded >10	13	0
GREEN LINCOLN CONTINENTAL #56-5850B	<5	60	0
	5 - 10	25	0
	>10	8	0
	Excluded <5	0	0
	Excluded 5 - 10	0	0
	Excluded >10	7	0
SEAWIND SPEEDBOAT SW CORNER OF BUILDING	<5	23	1
	5 - 10	7	0
	>10	0	0
	Excluded <5	0	0
	Excluded 5 - 10	0	0
	Excluded >10	6	0
SMOKER CRAFT MAGNUM 162 - NE CORNER	<5	3	4
	5 - 10	5	0
	>10	1	0
	Excluded <5	0	0
	Excluded 5 - 10	0	0
	Excluded >10	1	0
PONTIAC SUNRISE #569558A	<5	40	1
	5 - 10	13	2
	>10	4	0
	Excluded <5	0	0
	Excluded 5 - 10	0	0
	Excluded >10	13	0

SUMMARY OF ASBESTOS MEASUREMENTS FOR
Screening Plant

Table 3: Indoor Dust Sampling Results (Fibers/cm2) for Screening Plant

Sample Location	Fiber Length (microns)	Dust Loading (fibers/square centimeter)	
		Tremolite/Actinolite Series	Chrysotile
REINELL BOAT #MT949AJU	<5	42076.5	841.5
	5 - 10	10098.4	841.5
	>10	3366.1	841.5
	Excluded <5	Below Detection Limit	Below Detection Limit
	Excluded 5 - 10	Below Detection Limit	Below Detection Limit
	Excluded >10	10939.9	Below Detection Limit
GREEN LINCOLN CONTINENTAL #56-5850B	<5	11220.4	BDL
	5 - 10	4675.2	Below Detection Limit
	>10	1496.0	Below Detection Limit
	Excluded <5	Below Detection Limit	Below Detection Limit
	Excluded 5 - 10	Below Detection Limit	Below Detection Limit
	Excluded >10	1309	Below Detection Limit
SEAWIND SPEEDBOAT SW CORNER OF BUILDING	<5	19355.2	841.5
	5 - 10	5890.7	Below Detection Limit
	>10	Below Detection Limit	Below Detection Limit
	Excluded <5	Below Detection Limit	Below Detection Limit
	Excluded 5 - 10	Below Detection Limit	Below Detection Limit
	Excluded >10	5049.2	Below Detection Limit
SMOKER CRAFT MAGNUM 162 - NE CORNER	<5	504.9	673.2
	5 - 10	841.5	Below Detection Limit
	>10	168.3	Below Detection Limit
	Excluded <5	Below Detection Limit	Below Detection Limit
	Excluded 5 - 10	Below Detection Limit	Below Detection Limit
	Excluded >10	168.3	Below Detection Limit
PONTIAC SUNRISE #569558A	<5	33661.2	841.5
	5 - 10	10939.9	1683.1
	>10	3366.1	Below Detection Limit
	Excluded <5	Below Detection Limit	Below Detection Limit
	Excluded 5 - 10	Below Detection Limit	Below Detection Limit
	Excluded >10	10939.9	Below Detection Limit

Table 4: Soil and Bulk Insulation Sampling Results for the Screening Plant Analyzed by Polarized Light Microscopy

Sample Location	Date Sampled	Material	Asbestos Concentration (%)	
			Tremolite/Actinolite Series	Chrysotile
topsoil	Dec. 1999	Soil	Not Detected	Not Detected
topsoil	Dec. 1999	Soil	Not Detected	Not Detected
topsoil	Dec. 1999	Soil	Not Detected	Not Detected
topsoil	Dec. 1999	Soil	Not Detected	Not Detected
topsoil	Dec. 1999	Soil	Not Detected	Not Detected
topsoil	Dec. 1999	Soil	Not Detected	Not Detected
topsoil	Dec. 1999	Soil	Trace (< 1%)	Not Detected
topsoil	Dec. 1999	Soil	Trace (< 1%)	Not Detected
topsoil	Dec. 1999	Soil	Trace (< 1%)	Not Detected
topsoil/bedding	Dec. 1999	Soil	1%	Not Detected
fill/bedding	Dec. 1999	Soil	Trace (< 1%)	Not Detected
topsoil	Dec. 1999	Soil	Not Detected	Not Detected
fill/topsoil	Dec. 1999	Soil	1%	Not Detected
fill/topsoil	Dec. 1999	Soil	Trace (< 1%)	Not Detected
topsoil	Dec. 1999	Soil	Not Detected	Not Detected
sediment	Dec. 1999	Soil	Not Detected	Not Detected
fill	Dec. 1999	Soil	2%	Not Detected
vermiculite pile; height of pile 8'; likely all vermiculite	Dec. 1999	Soil	2%	Not Detected
1" frozen; vermiculite pile	Dec. 1999	Soil	1%	Not Detected
1" frozen; vermiculite over surface; asphalt at 3"	Dec. 1999	Soil	Trace (< 1%)	Not Detected
vermiculite piles; depth of piles 6-12"	Dec. 1999	Soil	2%	Not Detected
vermiculite spread on slab; depth >6"	Dec. 1999	Soil	4%	Not Detected

Sample Location	Date Sampled	Material	Asbestos Concentration (%)	
			Tremolite/Actinolite Series	Chrysotile
vermiculite spread on road; asphalt at 3" to 6"	Dec. 1999	Soil	2%	Not Detected
vermiculite pile >18" deep	Dec. 1999	Soil	2%	Not Detected
vermiculite pile	Dec. 1999	Soil	Trace (< 1%)	Not Detected
pile of vermiculite >24" deep	Dec. 1999	Soil	Trace (< 1%)	Not Detected
mixed vermiculite and soil to 24"	Dec. 1999	Soil	1%	Not Detected
pile of mixed vermiculite and soil	Dec. 1999	Soil	Trace (< 1%)	Not Detected
fill	Dec. 1999	Soil	2%	Not Detected
fill	Dec. 1999	Soil	1%	Not Detected
bedding soil	Dec. 1999	Soil	Trace (< 1%)	Not Detected
topsoil	Dec. 1999	Soil	Trace (< 1%)	Not Detected
topsoil	Dec. 1999	Soil	Trace (< 1%)	Not Detected
topsoil	Dec. 1999	Soil	Trace (< 1%)	Not Detected
topsoil	Dec. 1999	Soil	1%	Not Detected
bedding soil	Dec. 1999	Soil	Not Detected	Not Detected
topsoil	Dec. 1999	Soil	Trace (< 1%)	Not Detected
bedding soil	Dec. 1999	Soil	Not Detected	Not Detected
topsoil	Dec. 1999	Soil	Trace (< 1%)	Not Detected
topsoil	Dec. 1999	Soil	2%	Not Detected
topsoil	Dec. 1999	Soil	2%	Not Detected
topsoil	Dec. 1999	Soil	Trace (< 1%)	Not Detected
fill	Dec. 1999	Soil	1%	Not Detected
fill	Dec. 1999	Soil	Trace (< 1%)	Not Detected
soil and vermiculite mix	Dec. 1999	Soil	2%	Not Detected
fill	Dec. 1999	Soil	Trace (< 1%)	Not Detected
topsoil	Dec. 1999	Soil	2%	Not Detected

Sample Location	Date Sampled	Material	Asbestos Concentration (%)	
			Tremolite/Actinolite Series	Chrysotile
subsoil	Dec. 1999	Soil	Trace (< 1%)	Not Detected
topsoil	Dec. 1999	Soil	Trace (< 1%)	Not Detected
topsoil	Dec. 1999	Soil	Trace (< 1%)	Not Detected
topsoil	Dec. 1999	Soil	Trace (< 1%)	Not Detected
fill	Dec. 1999	Soil	Trace (< 1%)	Not Detected
topsoil	Dec. 1999	Soil	Trace (< 1%)	Not Detected
topsoil	Dec. 1999	Soil	Trace (< 1%)	Not Detected
topsoil	Dec. 1999	Soil	Trace (< 1%)	Not Detected
fill	Dec. 1999	Soil	1%	Not Detected
fill	Dec. 1999	Soil	Trace (< 1%)	Not Detected
fill	Dec. 1999	Soil	Trace (< 1%)	Not Detected
topsoil	Dec. 1999	Soil	Trace (< 1%)	Not Detected
topsoil	Dec. 1999	Soil	Trace (< 1%)	Not Detected
topsoil	Dec. 1999	Soil	1%	Not Detected
topsoil	Dec. 1999	Soil	1%	Not Detected
fill	Dec. 1999	Soil	Not Detected	Not Detected
topsoil	Dec. 1999	Soil	2%	Not Detected
bedding soil	Dec. 1999	Soil	Not Detected	Not Detected
bedding soil	Dec. 1999	Soil	Trace (< 1%)	Not Detected
topsoil	Dec. 1999	Soil	Trace (< 1%)	Not Detected
bedding soil	Dec. 1999	Soil	Trace (< 1%)	Not Detected
topsoil	Dec. 1999	Soil	Trace (< 1%)	Not Detected
topsoil	Dec. 1999	Soil	2%	Not Detected
fill	Dec. 1999	Soil	3%	Not Detected
fill	Dec. 1999	Soil	1%	Not Detected
topsoil	Dec. 1999	Soil	Trace (< 1%)	Not Detected
bedding	Dec. 1999	Soil	Not Detected	Not Detected
topsoil	Dec. 1999	Soil	Trace (< 1%)	Not Detected
topsoil	Dec. 1999	Soil	Trace (< 1%)	Not Detected

Sample Location	Date Sampled	Material	Asbestos Concentration (%)	
			Tremolite/Actinolite Series	Chrysotile
topsoil	Dec. 1999	Soil	Trace (< 1%)	Not Detected
topsoil	Dec. 1999	Soil	Trace (< 1%)	Not Detected
topsoil	Dec. 1999	Soil	Not Detected	Not Detected
topsoil	Dec. 1999	Soil	Trace (< 1%)	Not Detected
topsoil	Dec. 1999	Soil	Not Detected	Not Detected
topsoil	Dec. 1999	Soil	Trace (< 1%)	Not Detected
topsoil	Dec. 1999	Soil	1%	Not Detected
topsoil	Dec. 1999	Soil	Not Detected	Not Detected
0-2 inches depth	Mar. 2000	Soil	1%	Not Detected
2-12 inches depth	Mar. 2000	Soil	1%	Not Detected
0-2 inches depth	Mar. 2000	Soil	2%	Not Detected
2-12 inches depth	Mar. 2000	Soil	2%	Not Detected
0-2 inches depth	Mar. 2000	Soil	2%	Not Detected
2-12 inches depth	Mar. 2000	Soil	3%	Not Detected
0-2 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
2-12 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
2-12 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
2-12 inches depth	Mar. 2000	Soil	Not Detected	Not Detected
0-1 inch depth	Mar. 2000	Soil	1%	Not Detected
0-1 inch depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Mar. 2000	Soil	3%	Not Detected
0-2 inches depth	Mar. 2000	Soil	2%	Not Detected

Sample Location	Date Sampled	Material	Asbestos Concentration (%)	
			Tremolite/Actinolite Series	Chrysotile
0-2 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Mar. 2000	Soil	Not Detected	Not Detected
0-2 inches depth	Mar. 2000	Soil	Not Detected	Not Detected
0-2 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Mar. 2000	Soil	3%	Not Detected
0-2 inches depth	Mar. 2000	Soil	3%	Not Detected
0-2 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Mar. 2000	Soil	4%	Not Detected
0-2 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Mar. 2000	Soil	Not Detected	Not Detected
0-2 inches depth	Mar. 2000	Soil	3%	Not Detected
2-12 inches depth	Mar. 2000	Soil	Not Detected	Not Detected
2-12 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
2-12 inches depth	Mar. 2000	Soil	Not Detected	Not Detected
0-12 inches depth	Mar. 2000	Soil	Not Detected	Not Detected
0-12 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
2-12 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
0-12 inches depth	Mar. 2000	Soil	8%	Not Detected
2-12 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
0-24 inches depth	Mar. 2000	Soil	1%	Not Detected
0-24 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
0-24 inches depth	Mar. 2000	Soil	Not Detected	Not Detected
26-30 inches depth	Mar. 2000	Soil	2%	Not Detected
18-32 inches depth	Mar. 2000	Soil	2%	Not Detected

SUMMARY OF ASBESTOS MEASUREMENTS FOR
Export Area

Table 1: Indoor Air Sampling Results for Export Area

Sample Location	Fiber Length (microns)	Asbestos Concentration (Fibers per cubic centimeter)			
		Tremolite/Actinolite Series		Chrysotile	
		Original	Recount	Original	Recount
Main Open Warehouse	<5	Not Detected	0.00028	Not Detected	Not Detected
	5 - 10	Not Detected	Not Detected	Not Detected	Not Detected
	>10	Not Detected	Not Detected	Not Detected	Not Detected
	Other	0.00085	Not Detected	Not Detected	Not Detected
Main Open Warehouse (Planer Bldg.)	<5	0.00340	0.00113	Not Detected	Not Detected
	5 - 10	Not Detected	0.00028	Not Detected	Not Detected
	>10	Not Detected	Not Detected	Not Detected	Not Detected
	Other	0.00255	0.00085	Not Detected	Not Detected
Main Open Warehouse (Spencer Bldg.)	<5	Not Detected	Not Detected	Not Detected	Not Detected
	5 - 10	Not Detected	Not Detected	Not Detected	Not Detected
	>10	Not Detected	Not Detected	Not Detected	Not Detected
	Other	0.00089	0.00030	Not Detected	Not Detected
Garage	<5	0.00085	0.00028	Not Detected	Not Detected
	5 - 10	Not Detected	Not Detected	Not Detected	Not Detected
	>10	Not Detected	Not Detected	Not Detected	Not Detected
	Other	0.00085	0.00028	Not Detected	Not Detected
Woodshed	<5	0.00085	0.00028	Not Detected	Not Detected
	5 - 10	0.00085	0.00028	Not Detected	Not Detected
	>10	0.00085	0.00028	Not Detected	Not Detected
	Other	0.00255	0.00085	Not Detected	Not Detected

Table 2: Soil and Bulk Insulation Sampling Results for the Export Area Analyzed by Polarized Light Microscopy

Sample Location	Date Sampled	Material	Asbestos Concentration (%)	
			Tremolite/Actinolite Series	Chrysotile
0-2 inches depth	Dec. 1999	Soil	Not Detected	Not Detected
2-12 inches depth	Dec. 1999	Soil	Not Detected	Not Detected
0-2 inches depth	Dec. 1999	Soil	Not Detected	Not Detected
2-12 inches depth	Dec. 1999	Soil	Not Detected	Not Detected
0-2 inches depth	Dec. 1999	Soil	Not Detected	Not Detected
2-12 inches depth	Dec. 1999	Soil	Not Detected	Not Detected
0-2 inches depth	Dec. 1999	Soil	Not Detected	Not Detected
2-12 inches depth	Dec. 1999	Soil	Not Detected	Not Detected
0-2 inches depth	Dec. 1999	Soil	Not Detected	Not Detected
2-12 inches depth	Dec. 1999	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Dec. 1999	Soil	Trace (< 1%)	Not Detected
2-12 inches depth	Dec. 1999	Soil	Not Detected	Not Detected
0-2 inches depth	Dec. 1999	Soil	Not Detected	Not Detected
2-12 inches depth	Dec. 1999	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Dec. 1999	Soil	2%	Not Detected
2-12 inches depth	Dec. 1999	Soil	2%	Not Detected
0-2 inches depth	Dec. 1999	Soil	Trace (< 1%)	Not Detected
2-12 inches depth	Dec. 1999	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Dec. 1999	Soil	Trace (< 1%)	Not Detected
2-12 inches depth	Dec. 1999	Soil	Not Detected	Not Detected
0-2 inches depth	Dec. 1999	Soil	Trace (< 1%)	Not Detected
2-12 inches depth	Dec. 1999	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Dec. 1999	Soil	Trace (< 1%)	Not Detected
2-12 inches depth	Dec. 1999	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Dec. 1999	Soil	Trace (< 1%)	Not Detected
2-12 inches depth	Dec. 1999	Soil	Not Detected	Not Detected

Sample Location	Date Sampled	Material	Asbestos Concentration (%)	
			Tremolite/Actinolite Series	Chrysotile
0-2 inches depth	Dec. 1999	Soil	3%	Not Detected
2-12 inches depth	Dec. 1999	Soil	5%	Not Detected
0-2 inches depth	Dec. 1999	Soil	Trace (< 1%)	Not Detected
2-12 inches depth	Dec. 1999	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Dec. 1999	Soil	Not Detected	Not Detected
0-2 inches depth	Dec. 1999	Soil	Not Detected	Not Detected
0-2 inches depth	Dec. 1999	Soil	2%	Not Detected
0-2 inches depth	Dec. 1999	Soil	Not Detected	Not Detected
0-2 inches depth	Dec. 1999	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Dec. 1999	Soil	Not Detected	Not Detected
0-2 inches depth	Dec. 1999	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Dec. 1999	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Dec. 1999	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Dec. 1999	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Dec. 1999	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Dec. 1999	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Dec. 1999	Soil	2%	Not Detected
0-2 inches depth	Dec. 1999	Soil	2%	Not Detected
0-2 inches depth	Dec. 1999	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Dec. 1999	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Dec. 1999	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Dec. 1999	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Dec. 1999	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Dec. 1999	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Dec. 1999	Soil	Not Detected	Not Detected
0-2 inches depth	Dec. 1999	Soil	Not Detected	Not Detected
0-24 inches depth	Dec. 1999	Soil	Not Detected	Not Detected
0-24 inches depth	Dec. 1999	Soil	Not Detected	Not Detected
0-24 inches depth	Dec. 1999	Soil	Not Detected	Not Detected

Sample Location	Date Sampled	Material	Asbestos Concentration (%)	
			Tremolite/Actinolite Series	Chrysotile
0-24 inches depth	Dec. 1999	Soil	Not Detected	Not Detected
0-24 inches depth	Dec. 1999	Soil	Not Detected	Not Detected
0-24 inches depth	Dec. 1999	Soil	Not Detected	Not Detected
0-24 inches depth	Dec. 1999	Soil	Trace (< 1%)	Not Detected
0-24 inches depth	Dec. 1999	Soil	Trace (< 1%)	Not Detected
2-12 inches depth	Dec. 1999	Soil	Not Detected	Not Detected
0-2 inches depth	Dec. 1999	Soil	Trace (< 1%)	Not Detected
2-12 inches depth	Dec. 1999	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Dec. 1999	Soil	Not Detected	Not Detected
2-12 inches depth	Dec. 1999	Soil	Not Detected	Not Detected
0-2 inches depth	Dec. 1999	Soil	Trace (< 1%)	Not Detected
2-12 inches depth	Dec. 1999	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Dec. 1999	Soil	Trace (< 1%)	Not Detected
2-12 inches depth	Dec. 1999	Soil	2%	Not Detected
0-2 inches depth	Dec. 1999	Soil	Trace (< 1%)	Not Detected
2-12 inches depth	Dec. 1999	Soil	Not Detected	Not Detected
0-2 inches depth	Dec. 1999	Soil	2%	Not Detected
2-12 inches depth	Dec. 1999	Soil	2%	Not Detected
0-2 inches depth	Dec. 1999	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
2-12 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
2-12 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Mar. 2000	Soil	5%	Not Detected
2-12 inches depth	Mar. 2000	Soil	10%	Not Detected
0-2 inches depth	Mar. 2000	Soil	Not Detected	Not Detected
2-12 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Mar. 2000	Soil	5%	Not Detected
2-12 inches depth	Mar. 2000	Soil	2%	Not Detected

Sample Location	Date Sampled	Material	Asbestos Concentration (%)	
			Tremolite/Actinolite Series	Chrysotile
0-2 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
2-12 inches depth	Mar. 2000	Soil	Not Detected	Not Detected
0-2 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
2-12 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
2-12 inches depth	Mar. 2000	Soil	Not Detected	Not Detected
0-2 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
2-12 inches depth	Mar. 2000	Soil	2%	Not Detected
0-2 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
2-12 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
2-12 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Mar. 2000	Soil	Not Detected	Not Detected
2-12 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Mar. 2000	Soil	1%	Not Detected
2-12 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Mar. 2000	Soil	1%	Not Detected
2-12 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Mar. 2000	Soil	1%	Not Detected
2-12 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Mar. 2000	Soil	1%	Not Detected
2-12 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
2-12 inches depth	Mar. 2000	Soil	Trace (< 1%)	Not Detected
0-2 inches depth	Mar. 2000	Other	2%	Not Detected

ATTACHMENT 2

MEMOS FROM REGIONAL TOXICOLOGIST, THE AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY, AND THE PUBLIC HEALTH SERVICE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII (8EPR-PS)
999 18th STREET - SUITE 500
DENVER, COLORADO 80202-2405

MAY 17 2000

Region VIII

MEMORANDUM

SUBJECT: Residual mineral fiber contamination at the former W.R. Grace **Screening Plant** and **Export Plant** poses an imminent and substantial endangerment to public health.

FROM: Christopher P. Weis, Ph.D., DABT
Regional Toxicologist

TO: Paul Peronard, On-Scene Coordinator
Libby Asbestos Site

I PURPOSE

This memorandum addresses rationale for determination of an imminent and substantial endangerment to public health posed by residual amphibole mineral fiber contamination at former vermiculite processing facilities in and near Libby, Montana. Processed ore from former vermiculite mining operations on nearby Zonolite mountain was brought to these facilities for refining which included screening, sizing (Screening Plant), exfoliation, bagging (Export Plant) and shipping (both). During the refining, amphibole mineral fibers of the tremolite-actinolite-richterite-winchite solid solution series (figure 1, hereafter referred to as 'tremolite, amphibole, or asbestos'[1]) were released to the environment in large quantities. In the interest of public health, I recommend that appropriate actions be initiated to reduce or eliminate exposure to mineral fibers at these locations.

II SUMMARY OF FINDINGS:

1) Fibrous minerals found in the vicinity of the former Screening and Export Plants are amphibole asbestiform in habit, are of respirable size, and are known to induce lung cancer, mesothelioma, and asbestosis upon inhalation exposure.

2) Soil exposure pathways from source areas to humans are presently complete at both facilities. Known concentrations of asbestos mineral fibers have been identified in soil at and near the subject facilities. This contaminated soil presents an ongoing source of asbestos which can become entrained in air and can be transported on vehicles, pets, and shoes to homes and other areas of potential secondary human exposure.

[1]The tremolite solid solution series of fibers found in the Libby ore deposit is known to have caused human disease and death of workers, family members of workers, and individuals not otherwise associated with the mining, milling, or processing operations in and near

3) Asbestiform mineral fibers have been identified in dust at both facilities. This dust has settled from air during ongoing re-entrainment of fibers from solid media (soil, source material, etc.). As activity patterns fluctuate at these facilities fibers can become entrained in air presenting an ongoing source of inhalation exposure to residents, workers, and the public.

4) Despite passive sampling procedures conducted during wet meteorological conditions (expected to bias sampling such as to undercount fiber concentrations), asbestiform mineral fibers have been identified in air at both facilities.

5) Fibers identified in air include a high proportion of long, thin amphiboles. There is strong evidence for increased toxicity for these longer fibers.

III BACKGROUND:

Vermiculite ore bodies on Zonolite mountain are associated with tremolite ranging in concentration to nearly 100% in selected areas (W.R. Grace). Although early exploration and mining efforts by the Zonolite Company focused upon the commercial viability of fibrous amphibole deposits found on Zonolite Mountain (DOI, 1928) no commercial production of tremolite is reported. Vermiculite was discovered in the Rainy Creek Mining District of Lincoln County, Montana in 1916 by E.N. Alley. Alley formed the Zonolite Company and began commercial production of vermiculite in 1921. Another company, the Vermiculite and Asbestos Company (later known as the Universal Insulation Company), operated on the same deposits (BOM, 1953). W.R. Grace purchased the mining operations in 1963 and greatly increased production of vermiculite until 1990 when mining and milling of vermiculite ceased. During early mining operations airborne fiber concentrations at the mine exceeded 100 fibers/cc in several job classifications (Amandus et al, 1987). Airborne fiber concentrations in the residential area of Libby exceeded the present occupational Permissible Exposure Level (PEL) of 0.1 fiber/cubic centimeter established by OSHA 1994 (MRI, 1982; Eschenbach deposition). This exposure limit is recognized as being associated with significant risk (3.4 additional asbestos-related cancers per 1000 individuals as per OSHA estimates) but is the practical lower limit of detection using phase contrast microscopy (PCM) as a measurement technique (OSHA, 1994).

Amphibole mineral fibers, including tremolite, are known to cause a variety of lethal and sub-lethal health effects as discussed below. Evidence of the lethal effects of exposure to tremolite from the vermiculite ore body on Zonolite Mountain is abundant. During the 1980s Lockey et al. (1984) and then the National Institutes for Occupational Safety and Health (NIOSH) (Amandus et al., 1987) conducted investigations of tremolite exposure and the morbidity and mortality of workers in various aspects of the mining, milling and refining process. These investigations, conducted during active vermiculite mining and processing activities in Libby, MT demonstrated multiple cases of lung cancer, mesothelioma, and asbestosis in workers exposed to variable concentrations of tremolite fiber at the mine. These findings were independently confirmed by a concurrent investigations conducted by MacDonald et al., (1986).

Since the cessation of vermiculite mining and processing operations in Libby, local physicians and nearby pulmonary specialists have continued to identify individuals suffering from

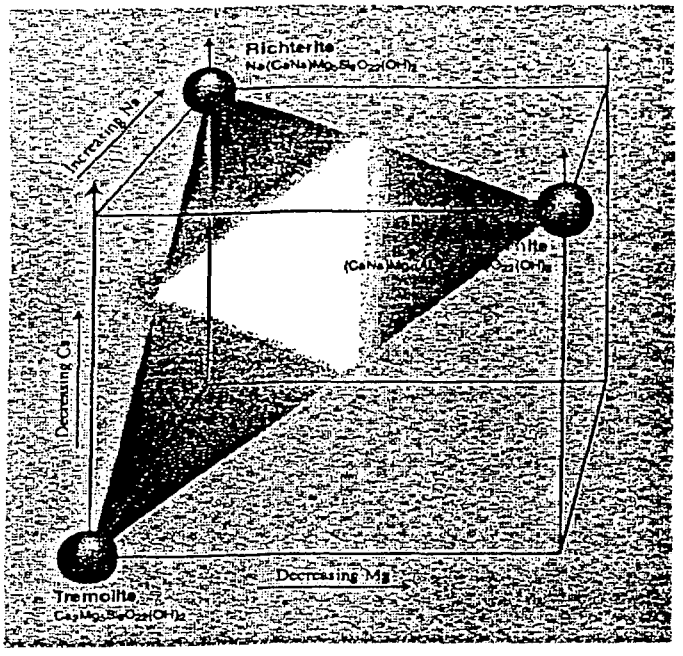


Figure 1: Phase diagram of the tremolite-richterite-winchite solid solution series (source: USGS, 2000).

asbestosis, lung cancer and mesothelioma as a result of exposure to tremolite mineral fibers . One pulmonologist has seen over 250 cases of asbestos-related disease from the Libby area (Whitehouse, 2000). While 142 of these individuals are believed to have been occupationally exposed during vermiculite mining operations, 29 individuals were secondarily exposed through household contact. Eleven cases are reported to have no connection with former mining or processing activities. These estimates are derived from a single physician working in the vicinity of Libby. Actual numbers of affected individuals are unknown and may be considerably higher.

Residual fiber contamination from the subject facilities continues to present uncontrolled exposure to workers, residents, and visitors at these facilities. These uncontrolled residual exposures prompted action by the U.S. Environmental Protection Agency Region 8 office in Denver, CO beginning on November 22, 1999. The investigative team is working closely with Local, State, and other Federal Agencies to determine the nature and extent of mineral fiber contamination throughout Libby. This memorandum presents the preliminary analytical results and endangerment findings for the subject facilities.

IV ENDANGERMENT RATIONALE:

The rationale for determination of an imminent and substantial endangerment from exposures at these former processing facilities is four fold: 1) amphibole fibers from the Libby vermiculite have been demonstrated to cause a variety of lethal and sublethal health effects in former workers, families of workers, and in non-occupationally exposed members of the Libby community; 2) complete human exposure pathways (by inhalation and ingestion) have been positively identified by personal observation and empirical measurement; 3) amphibole fibers of the tremolite series have been positively identified in multiple media (air, soil, and dust) at the subject facilities; and 4) risk estimation by a variety of qualitative and quantitative techniques indicates unacceptable human exposure by the inhalation route.

A. Health Effects of Libby Tremolite: *Hazard Assessment*

Fibrous minerals found in association with the Libby vermiculite are members of a solid solution series of hydrated magnesium silicates in which varying amounts of iron (Fe^{++}), sodium (Na^{+}), and aluminum (Al^{3+}) can substitute for calcium and magnesium in the solid solution (figure 1). The solid solution series includes tremolite [$Ca_2 Mg_5[Si_8 O_{22}](OH)_2$], actinolite [$Ca_2(Fe\ 2+,Mg)_5$

$(Si_8O_{22})(OH)_2]$, richterite $[Na(CaNa)(Mg,Fe^{2+}{}_5(Si_8O_{22})(OH)_2]$, and winchite $[NaCa(Mg,Fe^{++})_4AlSi_8O_{22}(OH)_2]$. Collectively with other minerals such as anthophyllite and amosite, these materials are referred to as amphiboles. In their fibrous habit, as identified in the ore body on Zonolite mountain, in association with un-expanded vermiculite, and in the exfoliated or expanded vermiculite product, these materials are generally referred to as asbestos (Eschenbach, 1983) and are capable of causing significant human morbidity and mortality upon inhalation.

Health effects associated with fiber exposure from the Libby facilities is documented in a variety of technical reports (EPA 1980; EPA 1985; EPA 1986), and peer reviewed studies. Lockey et al. (1984) demonstrated pleural radiographic changes and pleuritic chest symptoms in occupationally exposed workers with exposure to tremolite fiber from Libby. In a detailed study of occupational exposure (Amandus et al., 1987) to tremolite during vermiculite ore processing, Amandus and Wheeler (1987) documented significant increases of non-malignant respiratory disease and lung cancer in workers. In a study conducted concurrently with the NIOSH investigation, McDonald et al. (1986) determined independently that workers in the mine experienced a *"serious hazard from lung cancer, pneumonconiosis, and mesothelioma"* as a result of exposure to tremolite fibers associated with the vermiculite processing.

In addition to effects associated with inhalation exposure to mineral fibers several studies indicate elevated risk of gastrointestinal cancer following exposure (Seidman et al., 1986; Ehrlich et al., 1991; Gerhardsson de Verdier et al., 1992)

B. Identification of Complete Human Exposure Pathways: ***Dose-Response***

The EPA *Sampling and Quality Assurance Project Plan: Revision 1 for Libby, MT* -2000 (SAP, 2000) outlines the strategy, rationale, and specific procedures employed to characterize the presence of tremolite fibers in the environment in and around Libby, MT. Figure 1 of the Sampling Plan (presented herein as figure 2) is the ***Conceptual Site Model for Potential Human Exposure Pathways*** at the site. Environmental sampling in Libby is designed to identify mineral fibers at key locations along the pathways defined in figure 2 by quantitative and qualitative analysis. Pathways identified as 'complete' may be further analyzed to estimate risk associated with exposure. Alternatively, pathways judged to be of negligible risk may be addressed qualitatively during risk assessment. Asbestos exposure causes most significant risk by the inhalation pathway. Thus, sampling efforts and risk evaluation have focused on this important and primary exposure route. Also of importance for control of human exposures at the site are secondary pathways which may contribute to the air pathway. For example, house dust, soil, and primary source areas may significantly contribute to airborne fiber concentrations when they are stirred by wind or human activity. Additionally, materials may be purposely moved by bulk transport as ore or vermiculite product is removed or may be accidentally transported away from the site as contamination becomes attached to shoes, truck tires, pets, and clothing, etc.

At both subject facilities, tremolite fibers associated with former mining and milling operations have been identified and quantified using a variety of optical (Polarized Light Microscopy, transmission electron microscopy) and spectroscopic (electron diffraction, x-ray microprobe) techniques. Mineral fibers of the tremolite series have been identified at the subject facilities in all media tested including soil, dust, air, and in bulk materials left at the site. Bulk materials identified at the screening facility includes waste rock which contains high concentrations of fibrous tremolite, processed unexpanded vermiculite contaminated with mineral fiber in large dispersed piles at various uncontrolled locations,

and expanded vermiculite also known to have significant fiber content. Residents at the former screening and loading facility include children, adults, the elderly and individuals presently suffering from cardiovascular disease. Children are especially susceptible to mesothelioma due to their longer life expectancy relative to the latency of the disease (EPA, 1986). Additionally, workers at the facility may be exposed to concentrations of fiber in enclosed spaces under working conditions which may approach those experienced during the former active vermiculite processing.

Workers at the former Export Plant are presently exposed to fibers in air, dust, soil, and bulk materials left at the site. Re-entrainment of fibers in dust and soil by vehicular traffic, pedestrian traffic,

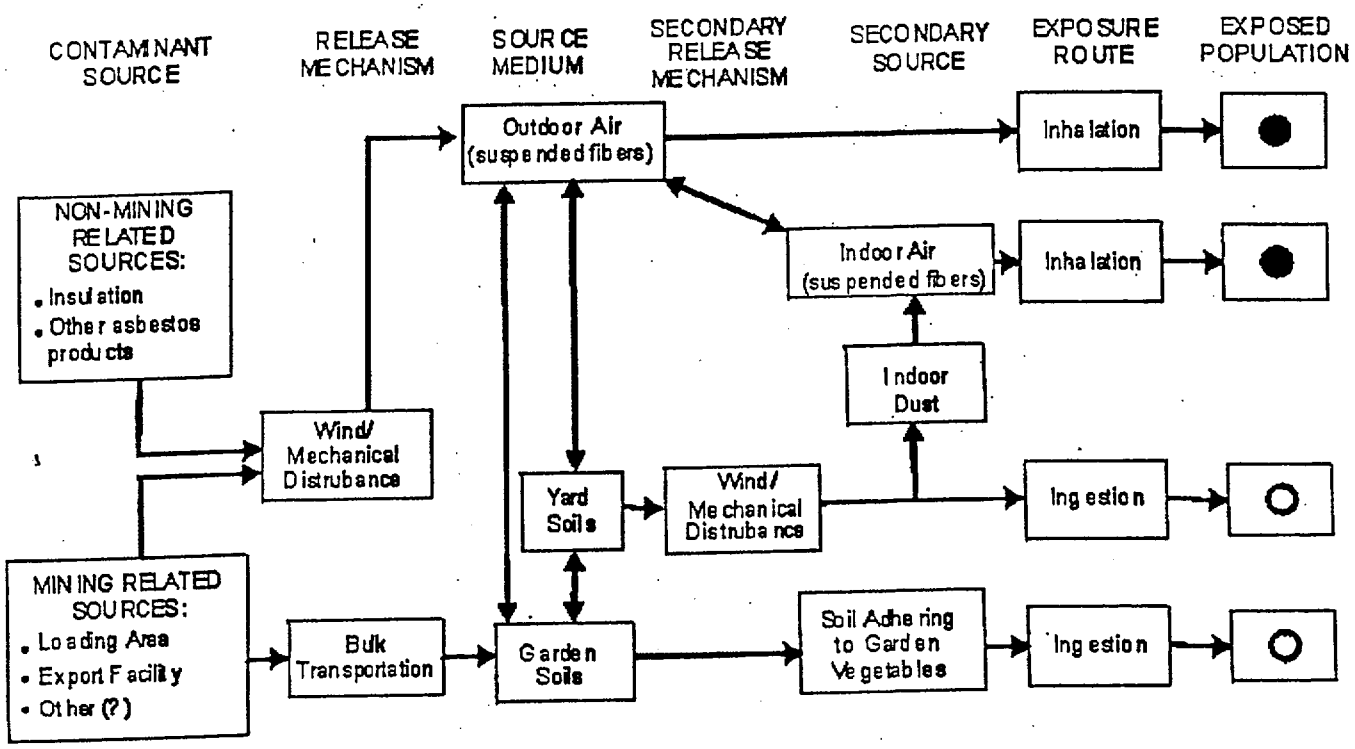


Figure Draft Conceptual Site Model - Potential Human Exposure Pathways to Asbestos at the Libby, Montana Site

○ = Pathway is complete, but minor; qualitative evaluation

● = Pathway is complete and could be significant; quantitative evaluation

FIGURE 2: Site Conceptual Model. This model depicts the possible exposure pathways for humans. All sampling for asbestos at the site occurs along one or more of these pathways.

and operational activities such as sweeping and wood milling is likely to continue unless action is taken to reduce fiber contamination at the facility. The Export Plant presently operates as a retail business thus exposing customers and the general public to tremolite mineral fibers. Residents, including children and the elderly may be exposed to tremolite fibers at adjacent recreational and residential areas. Thus, pathways of exposure from source areas to human receptors are complete.

C. Identification of Tremolite fibers at the Screening and Export Plants: *Exposure Assessment*

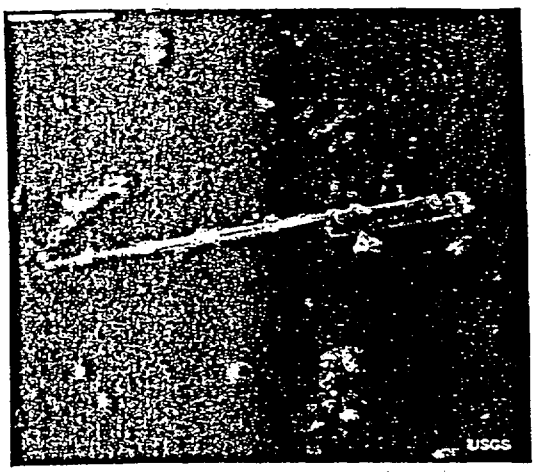


Figure 3: Scanning Electron Micrograph (SEM) of a tremolite fiber in dust collected from the former vermiculite screening facility.

Concentrations of fibers in dust and soil and sample locations at the subject facilities are presented as attachment 1 of the Action Memorandum (Peronard, 2000). Environmental data from soils indicate percent levels of fiber at numerous locations throughout both facilities. Fibers identified in air at the Screening plant and Export facility are presented in terms of the width and length of individual fibers (table1). Sampling and analytical methodologies are presented in detail in the Sampling and Analysis Plan (EPA, 1999). Briefly, air samples (~ 4,000 liters/sample) were collected on 0.45 µm filters and analyzed qualitatively and quantitatively using transmission electron microscopy (TEM). Dust samples (figure 3) were collected using a micro-vacuum into TEM cartridges and prepared indirectly for TEM analysis. Soil samples were collected from the top 2 inches, dried, riffle split, and analyzed using standard polarized light microscopy. Due to the fiber size and mineralogy fiber concentrations in soil may be underestimated.

Sampling results from all media indicate an abundance of tremolite fibers with a high proportion of fibers greater than 5 µm in length (figure 4). Fiber size (length and width) may influence toxicity. Clearance of fibers from the lung is inhibited and fiber toxicity significantly enhanced when fiber length is greater than approximately 8µm (Blake et al., 1998).

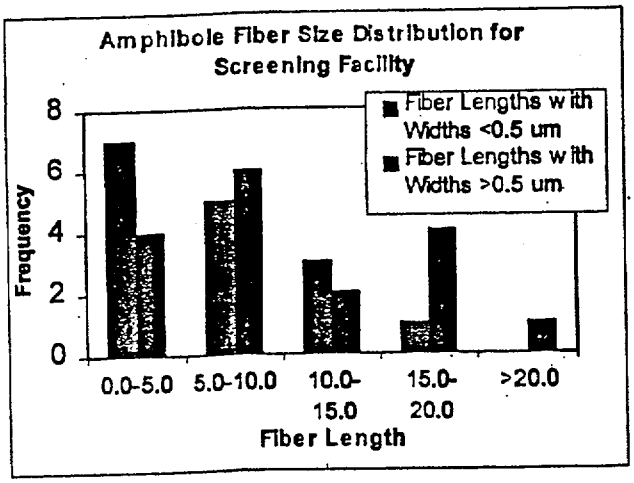


Figure 4: Distribution of fiber sizes in air samples collected from the residence at the former vermiculite Screening Facility.

Raw fiber counts and structural measurements from air samples collected at the Screening and Export Plants are presented in table 1. This series of indoor air samples were collected during humid meteorological conditions with no attendant air disturbance (i.e. non-aggressive sampling techniques were employed). It is possible that indoor air samples collected under drier, active working conditions might result in increased airborne fiber counts.

Several measurements have been made to estimate air concentrations resulting from the handling of asbestos-contaminated soils and bulk materials. These studies are useful in determining plausible human exposures from handling bulk material containing asbestos mineral fibers at the Screening and Export Plants. Addison et al., (1988) generated airborne dust clouds from mixtures of soil containing asbestos concentrations from 1 to 0.001% by weight. Dust concentrations were maintained at 5 mg/M^3 for 4 hours prior to measurement of airborne asbestos. The results indicated that, even the lowest soil asbestos concentrations (0.001%) were able to

produce airborne asbestos concentrations which greatly exceed recommended human exposure limits. A similar investigation conducted by EPA (1994) indicated the likelihood of elevated airborne asbestos concentrations as a result of vehicular traffic along roadways constructed of serpentine rock. Though more realistic than the Addison studies in terms of human exposure, the results of the EPA investigation also indicated significant risks associated with vehicle traffic along roadways containing 0.006 weight percent asbestos by TEM analysis.

It is plausible that fiber emissions from soil, dust, or other bulk material present at the subject facilities would exceed concentrations reported in the Addison and EPA investigations. Active disturbance of soils during vehicle and pedestrian traffic at the sites is likely to generate airborne concentrations of fiber well above risk-based limits for exposure to the general public. Residential exposures to airborne fiber at the screening facility would be expected to increase greatly during dusting, vacuuming, child's play and other household activity.

D. Risk Estimations for Exposure to Libby Tremolite: ***Risk Characterization***

Several groups have attempted to develop quantitative relationships between human exposure (dose) to asbestos and health effects (response) (Hughs et al., 1986; CPSC, 1983; EPA, 1984; NRC, 1984; Acheson et al., 1983; Berman et al., 1995). Most risk evaluations derive dose-response relationships from human epidemiology studies following occupational exposure to fiber. Such studies are often difficult to interpret due to; a) uncertain exposure estimates, b) poor dose characterization, c) mis-diagnosis of disease, d) concurrent exposure to other carcinogens, e) variable age at onset of exposure, and f) long latency periods prior to the onset of health effects. Recent efforts have employed exposure index information derived from detailed animal dose characterizations (Berman et al., 1995). The exposure index categorizes fibers into groups of different width and length which, in turn, represent categories of toxicological concern based upon animal studies. Indexing exposure as a function of fiber structure improves modeled dose-response relationships in these animal studies implying a strong relationship between fiber shape and toxicity (Berman et al., 1995). Human dose-response factors were then similarly adjusted to the exposure index based upon published fiber size distributions from human studies and a general risk assessment protocol was developed. This approach is consistent with recommendations of the National Research Council (1984) and with more recent recommendations of the NIOSH Inter-divisional Fiber Subcommittee. Both groups strongly support development of risk protocols based upon fiber characteristics.

Unit risks derived from various asbestos risk workgroups are presented in table 2 (NRC, 1984; Stayner et al., 1997; Berman et al., 1995). Unit risks as presented are difficult to compare due to variable exposure indices. Fibers counted by transmission electron microscopy (TEM) must be converted to phase contrast microscopic equivalents (PCME) by assuming observational characteristics. The conversion of TEM to PCME is a source of uncertainty in the risk evaluation for the site. It is not clear whether the conversion as applied underestimates or overestimates fiber exposure. Various techniques have been proposed for TEM-to-PCME conversion. The approach employed for this assessment is presented below.

TABLE 1: Raw Data Counts for Fibers Collected from Indoor Air*

DATA FOR AMPHIBOLES

Client Sample Number		Sample Location	Sample Prep	Amphibole					Asbestos Type	Class
				Length Units	Width Units	L-um**	W-um‡	AR§		
26132		Export Plant	Direct	28	3	7.78	0.17	46.7	Anthophylite	F
26132		Export Plant	Direct	24	5	6.67	0.28	24.0	Anthophylite	B
26132		Export Plant	Direct	13	13	3.61	0.72	5.0	Actinolite	F
26134		Export Plant	Direct	2.5	3	0.70	0.17	4.2	Actinolite	M
26134		Export Plant	Direct	9	4	2.50	0.22	11.3	Actinolite	M
26134		Export Plant	Direct	33	4	9.17	0.22	41.3	Actinolite	F
26134		Export Plant	Direct	5	5	1.39	0.28	5.0	Actinolite	M
26134		Export Plant	Direct	5	5	1.39	0.28	5.0	Actinolite	M
26134		Export Plant	Direct	5.5	5	1.53	0.28	5.5	Actinolite	F
26134		Export Plant	Direct	7	16	1.95	0.89	2.2	Actinolite	F
26134		Export Plant	Direct	39	45	10.84	2.50	4.3	Actinolite	M/X
26136		Export Plant	Direct	58	12	16.12	0.67	24.2	Actinolite	F/M
26138		Export Plant	Direct	15	8	4.17	0.44	9.4	Actinolite	F
26138		Export Plant	Direct	84	18	23.35	1.00	23.3	Actinolite	F
26140		Export Plant	Direct	10	5	2.78	0.28	10.0	Actinolite	F
26140		Export Plant	Direct	20	5	5.56	0.28	20.0	Actinolite	F
26140		Export Plant	Direct	36	8	10.01	0.44	22.5	Actinolite	MR
26140		Export Plant	Direct	154	18	42.81	1.00	42.8	Actinolite	F
26140		Export Plant	Direct	84	35	23.35	1.95	12.0	Actinolite	F
26140		Export Plant	Direct	231	70	64.22	3.89	16.5	Actinolite	F
26400	1/6/00	Screening Area	Direct	4	7	1.11	0.39	2.9	Actinolite	M20
26400	1/6/00	Screening Area	Direct	7	10	1.95	0.56	3.5	Actinolite	M20
26402	1/6/00	Screening Area	Direct	7	3	1.95	0.17	11.7	Actinolite	F
26402	1/6/00	Screening Area	Direct	8	7	2.22	0.39	5.7	Actinolite	F
26402	1/6/00	Screening Area	Direct	27	7	7.51	0.39	19.3	Actinolite	F
26402	1/6/00	Screening Area	Direct	8	8	2.22	0.44	5.0	Actinolite	DM10
26402	1/6/00	Screening Area	Direct	87	10	24.19	0.56	43.5	Actinolite	F
26402	1/6/00	Screening Area	Direct	60	13	16.68	0.72	23.1	Actinolite	F
26402	1/6/00	Screening Area	Direct	37	18	10.29	1.00	10.3	Actinolite	F
26402	1/6/00	Screening Area	Direct	15	20	4.17	1.11	3.8	Actinolite	F/X
26402	1/6/00	Screening Area	Direct	32	20	8.90	1.11	8.0	Actinolite	F
26402	1/10/00	Screening Area	Direct	12	5	3.34	0.28	12.0	Actinolite	B
26402	1/10/00	Screening Area	Direct	66	7	18.35	0.39	47.1	Actinolite	F
26402	1/10/00	Screening Area	Direct	34	9	9.45	0.50	18.9	Actinolite	F
26402	1/10/00	Screening Area	Direct	52	9	14.46	0.50	28.9	Actinolite	F
26402	1/10/00	Screening Area	Direct	26	10	7.23	0.56	13.0	Actinolite	F
26402	1/10/00	Screening Area	Direct	67	13	18.63	0.72	25.8	Actinolite	F
26402	1/10/00	Screening Area	Direct	60	20	16.68	1.11	15.0	Actinolite	F
26402	1/10/00	Screening Area	Direct	66	20	18.35	1.11	16.5	Actinolite	F
26404	1/6/00	Screening Area	Direct	35	5	9.73	0.28	35.0	Actinolite	F
26404	1/6/00	Screening Area	Direct	10.5	7	2.92	0.39	7.5	Actinolite	F
26404	1/6/00	Screening Area	Direct	28	7	7.78	0.39	20.0	Actinolite	F/X
26404	1/6/00	Screening Area	Direct	8	8	2.22	0.44	5.0	Actinolite	F
26404	1/6/00	Screening Area	Direct	35	8	9.73	0.44	21.9	Actinolite	F
26404	1/6/00	Screening Area	Direct	33	9	9.17	0.50	18.3	Actinolite	M
26404	1/6/00	Screening Area	Direct	6	10	1.67	0.56	3.0	Actinolite	F/X
26404	1/6/00	Screening Area	Direct	33	10	9.17	0.56	16.5	Actinolite	F
26404	1/6/00	Screening Area	Direct	26	15	7.23	0.83	8.7	Actinolite/Tremolite	F
26406	1/6/00	Screening Area	Direct	36	3	10.01	0.17	60.0	Actinolite	F
26406	1/6/00	Screening Area	Direct	20	4	5.56	0.22	25.0	Actinolite	F
26406	1/6/00	Screening Area	Direct	38	4	10.56	0.22	47.5	Actinolite	DM11
26406	1/6/00	Screening Area	Direct	40	4	11.12	0.22	50.0	Actinolite	F
26406	1/6/00	Screening Area	Direct	10	12	2.78	0.67	4.2	Actinolite	F

*Samples were collected according to Standard Operating Procedures outlined in the Sampling and Quality Assurance Project Plan: Revision 1

**fiber length in units of microns

‡ fiber width in units of microns

§ AR is the fiber aspect ratio or length to width ratio

Conversion of fiber counts and measurements from transmission electron microscope (TEM) to Phase Contrast Microscopic Equivalents (PCME):

Mineral fibers observed under high power (>20,000x) in the view field of a transmission electron microscope (TEM) are easily measured to less than a hundredth of a micron in width or length and can be positively identified using x-ray microprobe techniques and/or electron diffraction pattern analysis. By contrast, the phase contrast light microscope (PCM), which was historically used to measure fibers and estimate human exposure, is not capable of positive fiber identification and can only resolve fibers with widths of approximately 0.3 μm or greater. None-the-less, most available human toxicity data is associated with PCM measurements. Thus it is necessary to convert fiber measurements made by TEM into their respective PCM equivalents (PCME). For the purpose of this memorandum, I have converted TEM to PCME by the NIOSH 7402 recommended approach. Briefly, all fibers identified by TEM were measured under the electron microscope and only those with lengths greater than 5 μm, widths greater than 0.3 μm and an aspect ratio (length-to-width ratio) greater than 3 were included as PCME for the purpose of risk comparisons presented in table 3.

TABLE 2: Unit Risks for Asbestos
Normalized to Lifetime Exposure Index

UNIT RISKS *for asbestos exposure*			
Source	**Risk**	**units**	**fiber count**
RIS (EPA, 1986)	0.23	(f/mL)-1	PCME
NRC, 1984	0.154	(f/mL)-1	Assumes 70 year lifespan and PCME as per EPA
Stayner et al. 1997	7.8E-02	(f/mL)-1	Based on 0.1f/mL*45 yrs = 5/1000

All risk estimates are associated with variability and uncertainty. Sources of variability include changing exposures over time and variable biological susceptibility to disease (e.g. smokers vs. non-smokers). Sources of uncertainty include difficulties in measuring exposure, inaccuracies in disease diagnosis, and modeling difficulties associated with long latency of disease following exposure. As a result of variability and uncertainty in risk assessment, quantitative estimates of risk should be interpreted with caution. Typically, risk estimates can be expected to have an uncertainty spanning perhaps an order of magnitude. Risk estimates presented below represent risks following exposure to concentrations of amphibole fibers identified in air at the screening and export facilities. Air concentrations were recorded under quiescent and humid conditions. Air concentrations and exposures on dry days and/or with increased activity indoors may be significantly higher.

Table 3 presents quantitative estimates of inhalation risks from asbestos exposure from several different sources (IRIS, 1986; NRC, 1984; Stayner, 1997; Berman et al., 1995). In some cases (Stayner et al, 1997; Berman et al., 1995), risk estimates for mesothelioma are not available. Whereas, for other estimates (NRC, 1984; IRIS, 1986) risks for lung cancer and mesothelioma are combined.

There is significant and compelling evidence that fiber structure (length and width) may play an important role in asbestos risk, particularly for mesothelioma (Blake et al., 1998; Jianping, 1999;

Castranova, 1998; Berman et al., 1995). Addressing asbestos risk in terms of fiber structure requires careful measurement of fibers collected during sampling efforts. Several groups have strongly recommended routine fiber characterization in order to better understand the relationship between structure and health effects from fiber exposure (NRC, 1984, Berman et al., 1995). Unfortunately, most human health effect data for use in quantitative risk evaluation has been derived from exposure studies where fibers were not well characterized. These studies commonly employ Phase Contrast Microscopy (PCM) as a tool for fiber identification and measurement. However, PCM cannot distinguish asbestos from other fibrous materials nor can PCM identify fibers with widths less than approximately 0.3 μm. As a result of this short coming in fiber characterization, there is much uncertainty regarding actual human exposures in epidemiological studies which employ PCM as a tool for exposure measurement.

In Table 3 risk estimates are presented as a function of different exposure indices. In some cases (Berman et al., 1995; and Berman and Crump, 1999), fiber structure is well identified and employed as a tool for risk estimation. In other cases (NRC, 1984; IRIS, 1986; Stayner, 1997) actual asbestos fiber exposure is unknown and PCM analysis is used as a surrogate.

TABLE 3: Site-Specific Risk Estimates for Exposure to Fibers in Air at the Screening and Export Facilities.

					Fiber Counts												LUNG CANCER ONLY			LUNG CANCER ONLY
						Berman et al. 95			EPA/IRIS											
					L**	5-40	>40	>40	>5											
					W	<0.3	<0.3	>5	>0.3									Berman et al.95*	NRC 1984	IRIS-EPA 1986	Stayner et al 97
					AR				>3	Fiber Concentration (f/cc)							rat model			
ocation	Sample	Vol	AF	AG	GO	S1	S2	S3	S6	S1	S2	S3	S4	S5	S6		Copt(a)	PCME	PCME	PCME
xport rea	28132	4320	385	0.0105	30	2				5.66e-04	0.00e+00	0.00e+00	5.66e-04	0.00e+00	0.00e+00		9.62e-07	0.00e+00	0.00e+00	0.00e+00
	28134	4320	385	0.0105	30	1			1	2.83e-04	0.00e+00	0.00e+00	2.83e-04	0.00e+00	2.83e-04		4.81e-07	2.83e-04	2.83e-04	2.83e-04
	28136	4140	385	0.0105	30				1	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	2.95e-04		0.00e+00	2.95e-04	2.95e-04	2.95e-04
	28138	4320	385	0.0105	30				1	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	2.83e-04		0.00e+00	2.83e-04	2.83e-04	2.83e-04
	28140	4320	385	0.0105	30	1			4	2.83e-04	0.00e+00	0.00e+00	2.83e-04	2.83e-04	1.13e-03		4.81e-07	1.13e-03	1.13e-03	1.13e-03
															Mean C		3.85e-07	3.99e-04	3.99e-04	3.99e-04
															UR		0.00e+00	1.54e-01	2.30e-01	7.80e-02
															Risk		4.00e-05	6.00e-05	9.00e-05	3.00e-05
Scrning facility	26400	3960	385	0.0105	30					0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00		0.00e+00	0.00e+00	0.00e+00	0.00e+00
	26402	3960	385	0.0105	30				12	0.00e+00	0.00e+00	0.00e+00	6.17e-04	6.17e-04	3.70e-03		0.00e+00	3.70e-03	3.70e-03	3.70e-03
	26404	3960	385	0.0105	30	1			5	3.09e-04	0.00e+00	0.00e+00	1.23e-03	0.00e+00	1.54e-03		5.25e-07	1.54e-03	1.54e-03	1.54e-03
	26406	3960	385	0.0105	30	4				1.23e-03	0.00e+00	0.00e+00	3.09e-04	9.26e-04	0.00e+00		2.10e-06	0.00e+00	0.00e+00	0.00e+00
															Mean C		6.56e-07	1.31e-03	1.31e-03	1.31e-03
															UR		1.12e+01	1.54e-01	2.30e-01	7.80e-02
															Risk		4.00e-05	2.00e-04	3.00e-04	1.00e-04

* Relationship between dose and response is estimated based upon a non-linear mathematical fit to tumor data collected in rats (Berman et al., 1995)

** L=fiber length; W=fiber width; AR=fiber aspect ratio (length-to-width ratio)

V CONCLUSION:

Cumulative exposures to tremolite fibers at the subject facilities are likely to present an ongoing endangerment to residents, workers, and visitors to these areas. Cumulative exposures include exposures to contaminated soil, house dust, and air. It is likely that fiber concentrations measured in air are biased low due to the meteorological conditions which existed during the air sampling efforts (quiet and damp conditions). During periods of increased human activity, air concentrations may increase significantly. Sampling efforts to date demonstrate abundance of fibrous minerals in all media sampled. The chemical nature of the fibers identify them as asbestiform amphiboles known to cause multiple cancers in humans and animals at multiple target organs. These fibers are particularly dangerous when inhaled and are directly related to production of mesothelioma, a particularly lethal neoplasm of the mesodermal lining of the lung. Additionally, amphibole mineral fibers can cause a wide variety of malignant lung tumors.

In addition to the carcinogenic effects associated with tremolite fibers, non-malignant asbestosis can result in debilitating and lethal respiratory disease. Tremolite fibers can cause thickening and fibrosis of the pleural lining of the lung and scarring of the lung parenchyma. The resulting loss of lung compliance and respiratory capacity can progress over the course of several years.

It is likely that exposure to contaminated soil, dust, and air at the Export and Screening Plants will continue unless specific action is taken to abate these threats.

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HEALTH CONSULTATION

Libby Asbestos Site

Export Plant and Screening Plant

Libby, Lincoln County, Montana

CERCLIS NO. MT0009083840

May 17, 2000

U.S. Department of Health and Human Services
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
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Background and Statement of Issues

The Agency for Toxic Substances and Disease Registry (ATSDR) was requested by the U.S. Environmental Protection Agency, Region 8 (EPA) to provide a health consultation addressing the public health hazards associated with asbestos contamination at the former Screening Plant/Railroad Station and Export Plant/Exfoliation Plant in Libby, Montana. EPA is planning to conduct a removal action at the two facilities, and has specifically requested that ATSDR comment on whether the proposed actions are appropriate to protect the public health [1].

The former Screening Plant/Railroad Station and Export Plant/Exfoliation Plant (referred to herein as the screening plant and export plant) are part of a large scale vermiculite processing complex that was operated by Grace, Inc. in Libby, Montana until operations ceased in 1990 [2]. The vermiculite ore was stripped from the top of Zonolite Mountain located 7 miles northeast of Libby, and processed at a mill located adjacent to the mine [3]. The mill removed waste rock and overburden in a process known as beneficiation [2]. The vermiculite ore was then transported by truck down Rainy Creek Road to the screening plant located adjacent to the Kootenai River (see attachment, EPA figure 2).

The screening plant separated the ore into various sizes and loaded it onto railroad cars [2]. Some of the ore was then transported to one of the two exfoliation plants in the area to undergo further treatment[2]. The ore was heated to approximately 2,000 degrees Fahrenheit, causing it to "pop" or expand to 15-20 times its size. The former export plant covered in this health consultation is located on the northern edge of Libby along the Kootenai River. Another exfoliation plant operated in the town of Libby, however, this site is not covered in this health consultation, and is currently being investigated by EPA [2].

Through the 1960s, '70s and '80s, millions of tons of the vermiculite ore was transported to Grace plants and other companies in 30 states and six foreign countries. The raw vermiculite ore is used in numerous products such as gypsum wallboard and cinder blocks. Exfoliated vermiculite is used as loose fill insulation, as a fertilizer carrier, and as an aggregate for concrete [3]. Almost 80 percent of the world's vermiculite came from Libby [2].

Asbestos Exposure

The raw vermiculite ore from Libby is estimated to contain up to 21% to 26% fibrous actinolite/tremolite [4]. The actinolite/tremolite asbestos (herein referred to as asbestos) was released at high concentrations during the mining, milling, screening, and exfoliation processes [3,5]. Many workers employed at the mine and other vermiculite facilities were exposed to high airborne concentrations of asbestos fibers [3,5].

Non-occupational exposure to asbestos was also common in Libby for decades while the vermiculite facilities were in operation. Children frequently played in piles of expanded vermiculite located adjacent to baseball fields near the export plant [2]. Community members reported that clouds of dust emanating from the vermiculite piles were significant enough to halt baseball games. In addition, exposure to Libby residents was documented in air sampling conducted by Grace in 1975 showing 1.5 fibers/cubic centimeter (f/cc) in downtown Libby [2]. Sampling by

EPA in the 1980's also documented high airborne concentrations of asbestos; 0.5 f/cc 4.5 miles from the mine [2]. The OSHA occupational Permissible Exposure Limit (PEL) is currently 0.1 f/cc.

There is still a potential for community members to come in contact with asbestos-contaminated vermiculite. Contamination is present at the mine, screening plant, export plant, and along Rainy Creek Road. Asbestos-contaminated vermiculite was used as an aggregate in driveways, as a soil conditioner in gardens, and as loose fill insulation in homes.

It has been reported by local physicians some workers employed at the mine and vermiculite processing facilities have developed asbestos-related illnesses such as asbestosis, lung cancer, and mesothelioma. It has also been reported that some family members of workers have been similarly afflicted. This is likely due to asbestos transported home by workers. Further elaboration on the health effects from asbestos, and exposures in Libby are provided in the discussion section of this document.

In November 1999, the EPA was requested by the Lincoln County Health Board and City Officials from Libby to address ongoing exposures to asbestos contamination from past vermiculite mining/processing operations [2]. Since that time, the EPA has conducted sampling efforts to characterize the extent of contamination at the mine, processing facilities, and other areas in Libby. This health consultation will focus on the sampling data collected from the screening plant and the export plant.

Former Screening Plant

The former screening plant site is located along the Kootenai River approximately 4.5 miles northeast of Libby [2]. The site is approximately 21 acres, and now houses a storage facility for recreational vehicles, a whole sale nursery, and a mushroom farm [2]. The property owner's residence is also located on site [2]. Areas zoned residential are located south and west of the site [2]. The number of people employed at the nursery varies seasonally, but ranges from 6 to 20. The private residence on site is occupied by two individuals. Grandchildren of the residents are known to frequently visit and play on the site [2].

There are approximately two tons of unexpanded and expanded vermiculite stored on the site in deteriorating bags. Vermiculite piles are present inside and outside of buildings throughout the site [2]. In addition, there are over 3,000 3-gallon buckets of unexpanded vermiculite stored on site for use in the mushroom operation [2].

EPA conducted sampling activities at the former screening plant site in December 1999 [2]. Indoor air, indoor dust, and soil samples were collected from the site and analyzed for asbestos. Dust and soil samples were analyzed via Polarized Light Microscopy (PLM). Indoor air samples were analyzed via Transmission Electron Microscopy (TEM). Indoor dust samples were collected from five locations, indoor air samples were collected from four buildings, and 101 soil/bulk insulation samples were collected from the site (see attachments, EPA figure 4 and Summary of Asbestos Measurements for Screening Plant).

Asbestos concentrations in the top soil at the site ranged from non-detect to 4% (by weight). Asbestos was detected in 85 of the samples, with 18 samples exceeding 2% actinolite/tremolite. Fibers exceeding 10 micrometers (μm) in length were detected in 3 of the 4 air samples. The highest concentration of asbestos fibers (exceeding 5μm) were detected in the mushroom tunnel and office area (0.00093 f/cc). Tremolite/actinolite asbestos was also detected in all the indoor dust samples. Fibers in the dust exceeding 5μm in length ranged from 5 to 25 fibers per centimeter squared (cm^2).

Former Export Plant

The export plant ceased vermiculite expansion activities prior to 1981, and the vermiculite bagging operations were terminated later in 1990 when the mine closed [2]. The site is currently owned by the city of Libby, and is leased out to a retail lumber business. Several buildings and two former ballfields are located on the 11 acre site (see attachments, EPA figure 3 and Summary of Asbestos Measurements for Export Area). Similar to the screening plant, there is visible expanded and unexpanded vermiculite located on the property. Access to the site is unrestricted during non-business hours [2].

EPA conducted sampling at the site in December 1999 [2]. Five indoor air and 109 soil/bulk samples were collected and analyzed for asbestos by TEM and PLM, respectively.(see attached results). Asbestos concentrations in the soil ranged from non-detect to10% (by weight). Asbestos was detected in 76 of the samples, with 17 samples exceeding 2%. Airborne asbestos fibers exceeding 5μm in length were detected in the main open warehouse (planer building) and the woodshed at maximum concentrations of 0.00028 f/cc and 0.00085 f/cc, respectively.

Removal Action

EPA plans on conducting a time-critical removal action at both the screening plant site and the export facility. The purpose of the removal action is to mitigate the threat to the local population from exposure to asbestos contamination at the two sites [2].

Discussion

Tremolite is a naturally-occurring mineral belonging to the amphibole class of hydrated silicate minerals. Tremolite [$Ca_2Mg_5Si_8O_{22}(OH)_2$], which contains magnesium and calcium cations, often occurs together with actinolite [$Ca_2(Mg,Fe(II))_5Si_8O_{22}(OH)_2$]. Fibrous forms of tremolite and other siliceous amphiboles are commonly known as asbestos. The other asbestos mineral class, serpentines, includes chrysolite which is the predominant commercial form of asbestos [6]. While tremolite is not commercially produced itself, both fibrous and non-fibrous forms of the mineral are common contaminants in minerals such as chrysolite and vermiculite [7,8,9].

The vermiculite mine in Libby which marketed the product Zonolite, found fibrous actinolite/tremolite, non-fibrous actinolite/tremolite, and non-fibrous anthophyllite in raw ore and vermiculite. Fibrous actinolite/tremolite asbestos accounted for ~21–26% of the weight of raw ore and 2–6% of weight of vermiculite concentrate [7].

People may be exposed to asbestos when it is present in materials that are easily crumbled into small particles that can be suspended in air (i.e., friable materials and soil). Typically, exposure will occur only when the asbestos-containing material is disturbed in some way such that fibers are released into the air. In most cases, when asbestos-containing materials are solidly embedded or contained, exposure will be negligible [10, 11].

Information on the health effects comes mostly from studies of people exposed in the workplace, and from toxicological studies of animals [12]. There is considerable evidence that inhalation of asbestos fibers, including tremolite fibers, can produce lung cancer, malignant mesothelioma (a cancer of the thin membranes that surround the lung) , and non-malignant respiratory effects including asbestosis (buildup of scar-like tissue in the lung). Most studies indicate that the inhalation of long fibers (greater than 5μm in length, or about 1/5,000 of an inch) are more likely to cause injury [12]. The health effects from ingesting asbestos are unclear. Although some studies have indicated that oral exposure to asbestos may be linked to the development of gastrointestinal cancer, the majority of the data indicate that inhalation is the principal route of concern[12].

In Libby, Montana, it has been reported by local physicians that occupational exposures to the asbestos-contaminated vermiculite at the mine and processing facilities have resulted in numerous cases of asbestos-related conditions. One regional pulmonologist has reported nearly 200 cases of asbestos-related conditions in people from the Libby area. ATSDR has begun to coordinate a review of these cases.

Exposures at the Former Screening Plant and Export Facility

Decades of vermiculite processing at the former screening plant and export plant have resulted in extensive contamination of the outside soils and interior dust with tremolite/actinolite fibers. Sampling data collected by EPA in December 1999 detected levels in the soil up to 4 % at the screening plant, and up to 10% at the export facility. The actual soil concentrations at the two sites are likely to be higher because the PLM method used to analyze the samples is not sensitive enough to identify the smaller diameter fibers. According to EPA, reanalysis of samples previously determined as "not detected" by the PLM method, showed a significant number of fibers upon reanalysis by Scanning Electron Microscopy (SEM).

A completed exposure pathway to asbestos-contaminated soil and dust exists at both the screening plant site and the export plant site. Workers engaged in activities at the site may inhale asbestos fibers from disturbed soils and dust, particularly during the dry summer months. At the screening plant site, the owners reside on the property. Their grandchildren are known to visit frequently and play in the vermiculite piles. This represents a more significant concern since children are typically exposed to larger amounts of contamination at waste sites due their playing habits. In addition, exposure to asbestos at an early age results in longer residence times for fibers in the lungs over a lifetime.

In addition to the immediate exposures that may occur on site, asbestos contamination can migrate offsite through runoff and wind erosion affecting nearby populations. Asbestos fibers can persist in the environment, and due to their microscopic size, may stay suspended in air for long

periods of time [12]. This situation may be worsened by the frequent atmospheric inversions that occur in the Libby area. Asbestos can also be carried home on the shoes and clothing of workers exposing other family members.

The dimensions of the asbestos fibers detected at the screening plant are of concern. The fibers detected in the dust showed many fibers exceeding aspect ratios (length-to-width ratios) of 5:1. Most studies indicate that these longer fibers are more likely to cause injury [12].

There are a number of factors regarding the asbestos contamination in Libby, and specifically at the plants, that support the time critical removal. They include:

- Workers and residents are exposed to percentage levels of asbestos in soils at the two plants, and actual levels are likely to be higher due to the limitations of the PLM method in identifying the smaller diameter fibers.

- Consensus in the scientific community that the asbestos present throughout Libby is of the type (actinolite/tremolite) that is associated with adverse health effects in humans.

- Local physicians have reported that occupational exposures to the asbestos-contaminated vermiculite at the mine and processing facilities have resulted in numerous cases of asbestos-related conditions. One regional pulmonologist has reported nearly 200 cases of asbestos-related conditions in people from the Libby area. In addition, there are several reported cases of non-occupational exposures to the vermiculite in the Libby area that resulted in asbestos-related disease.

- Libby residents are likely to have been exposed in the past to airborne emissions from vermiculite processing facilities (at levels that may have exceeded OSHA occupational limits). In addition, current exposures may be occurring in Libby from vermiculite used in gardens, to insulate homes, and to pave driveways. These exposures are likely to have produced a baseline exposure to the community that would suggest that additional exposures to this population would pose an unacceptable risk.

Child Health Initiative

ATSDR considers the unique susceptibility of children in the evaluation of all hazardous waste sites. Children may have higher levels of exposure since they are more likely to disturb fiber-laden soils while playing. They are also lower to the ground, and have faster breathing rates that may increase the level of exposure to asbestos. In addition, the long-term retention of asbestos fibers in the lung, and the long latency period between exposure and onset of asbestos-related respiratory disease (10 to 40 years), suggest that an individual exposed earlier in life may be at greater risk than those exposed later in life [12]. It would therefore be prudent to reduce childhood exposure to asbestos. The proposed removal action by EPA will reduce exposures to children, particularly at the former screening plant where children frequently play.

Conclusions

1. Asbestos contamination is present at the screening plant and export plant at levels that pose a public health hazard.

2. The time critical removal action proposed by EPA is warranted to protect the public health.

Recommendations

None.

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Denver, CO 80202-2405

Dear Mr. Dodson,

I have been asked to respond to your May 12th letter to Assistant Surgeon General Sloan regarding EPA plans to take action to remediate asbestos contamination at two sites in Libby, Montana. The two specific sites of concern are the former vermiculite "Screening Plant" and "Export Plant".

Areas throughout these two sites have recently been evaluated by EPA and found to have asbestiform mineral fiber (actinolite-tremolite-richterite-winchite solid solution series) contamination in air, dust, and soil samples. The former "Screening Plant" is currently being used as a residence and small business with potentially hazardous asbestos exposures occurring among the residents, workers, and other visitors to the property. The former "Export Plant" is currently being used as a small business with potentially hazardous asbestos exposures occurring among the property owners, workers, and the general public, who may visit the facility or the recreational park which is located adjacent to the facility.

It is well established that asbestos is a very dangerous substance which can cause a number of health effects including asbestosis (a fibrogenic lung disease) and cancer, most notably lung cancer and mesothelioma. Gastrointestinal cancers have also been increased in studies of occupationally exposed workers. The current Occupational Safety and Health Administration (OSHA) permissible exposure level (PEL) for workers exposed to asbestos is 0.1 fibers per cubic centimeter of air measured as an 8-hour time weighted average (TWA). The National Institute for Occupational Safety and Health (NIOSH) recommended exposure level (REL) for asbestos is consistent with the OSHA PEL, but the agency further recommends that exposures be reduced to the lowest possible concentrations secondary to the carcinogenic properties of asbestos.

With regard to the hazardous nature of the type of asbestos found to be present in Libby, Montana, previous studies have found significant increases in non-malignant respiratory disease (asbestosis) and lung cancer among workers exposed to the asbestiform mineral fibers contaminating the vermiculite mined at the former Zonolite Mine and processing facilities. Additionally, a study of Ohio workers exposed to Libby vermiculite, containing much lower concentrations of asbestos, demonstrated significant shortness of breath, pleuritic chest pain, and radiographic abnormalities. There have also been a number of reported cases of non-occupational asbestos-related illnesses (i.e., asbestosis, mesothelioma) among current and former residents of Libby, Montana.

Based upon: 1) my understanding of the hazardous nature of asbestos, in general, 2) strong evidence demonstrating illness associated with the asbestiform mineral fibers found in Libby, Montana, 3) ongoing presence of asbestos contamination at the two aforementioned sites, and 4) consultation with the Montana State Health Officer and researchers from ATSDR, I concur with EPA plans to take necessary measures intended to preclude any further health risks posed by asbestos exposure among residents, workers, or the general public at the identified sites. If I may be of any further assistance in this matter, please contact me at (303) 844-7857.

Sincerely,

Aubrey Miller

Aubrey Miller, MD, MPH
Medical Coordinator Environmental
Emergencies & Hazards

cc: Henry Falk, ATSDR
Timothy Walker, ATSDR
Jeffrey Lybarger, ATSDR
Hugh Sloan, USPHS Reg. 8
Chris Weis, EPA, 8-EPR-PS
Paul Peronard, EPA, 8-EPR-ER

ATTACHMENT 3

ATTACHMENT 3

Applicable or Relevant and Appropriate Requirements (ARARs) for the Removal Actions at the Export Plant and Screening Plant
(Part of the Libby Asbestos Site, Libby, Montana)

In accordance with Section 300.415(j) of the NCP, all ARARs for the Site will be attained, to the extent practicable, given the scope of the project and the urgency of the situation.

Statute	Implementing Regulation	Status	Requirements	Comments
FEDERAL ARARS				
Endangered Species Act	50 CFR 200 50 CFR 402	N	Protects threatened or endangered (T&E) species and their habitat. Requires coordination with federal agencies to mitigate impacts.	If T&E species are identified within the removal areas, activities must be designed to conserve the T&E species and their habitat. To date no T&E species have been identified.
Fish & Wildlife Coordination Act	33 CFR 320-330 40 CFR 6.302(h) 50 CFR 83	A	Requires coordination with federal and state agencies for activities that have a negative impact on wildlife and/or non-game fish.	If the removal action involves activities that affect wildlife and/or non-game fish, conservation of habitats must be undertaken.
Clean Air Act	40 CFR Part 61, Subpart M (delegated to the state and incorporated by reference at ARM 17.8.341)	See below for specific regulations	National Emission Standards for Hazardous Air Pollutants (NESHAPS) for Asbestos	

A: Applicable
R: Relevant & Appropriate
N: Scope of the action does not trigger this requirement
X: Not an ARAR

Statute	Implementing Regulation	Status	Requirements	Comments
Clean Air Act	40 CFR 61.145(c) & (d)	A R	Standard for Demolition and Renovation. Provides detailed procedures for controlling asbestos releases during demolition of a building containing " regulated-asbestos containing material" (RACM) as defined in the regulations.	Applicable to building demolitions that will occur as part of the removal if certain threshold volumes of RACM are disturbed. The dust control portions of the regulations are relevant and appropriate for soil disturbance activities and for asbestos contaminated material that does not meet the strict definition of RACM.
Clean Air Act	40 CFR 61.149 Note: Section 61.149(c)(2) is not delegated to the State	R	Standard for Waste Disposal at Asbestos Mills. Provides detailed procedures for handling and disposal of asbestos containing waste material generated by an asbestos mill as defined by 40 CFR 61.142.	This regulation is considered relevant and appropriate to the soils disposal. It is not applicable because the facilities do not meet the regulatory definition of an asbestos mill.
Clean Air Act	40 CFR 61.150 Note: Section 61.150(a)(4) is not delegated to the State	A R	Standard for waste disposal for manufacturing, fabricating, demolition, renovation and spraying operations. Similar to 40 CFR 61.149, this section provided detailed procedures for processing, handling and transporting asbestos containing waste material generated during building demolition and renovation (among other sources).	Applicable to RACM generated by building demolitions that will occur as part of the removal. Relevant and appropriate for soil disturbance activities and for asbestos contaminated material that does not meet the strict definition of RACM.

A: Applicable
R: Relevant & Appropriate
N: Scope of the action does not trigger this requirement
X: Not an ARAR

Statute	Implementing Regulation	Status	Requirements	Comments
Clean Air Act	40 CFR 61.151 Note: Section 61.151(c) is not delegated to the State	R	Standard for inactive waste disposal sites for asbestos mills and manufacturing and fabricating operations. Provides requirements for covering, revegatation and signage at facilities where RACM will be left in place.	These requirements are not applicable because the facilities that are part of this removal do not meet the facility definitions in the regulation. These requirements would be relevant and appropriate to asbestos containing soils/ and or debris left in place.
Clean Air Act	40 CFR 61.152 Note: Section 61.152(b)(3) is not delegated to the State	A R	Air-cleaning. Provides detailed specifications if air cleaning is used as part of a system to control asbestos emissions control system.	These requirements would be applicable if air cleaning is part of the building demolitions. It would be relevant and appropriate to other air cleaning operations.
Clean Air Act	40 CFR 61.154 Note: Section 61.154(d) is not delegated to the State	X	Standard for active waste disposal sites. Provides requirements for off-site disposal sites receiving asbestos-containing waste material from building demolitions and other specific sources.	Does not meet the definition of an ARAR which applies only to on-site actions. Regulations are applicable to off-site disposal of ACM from the building demolitions.
Clean Air Act	40 CFR 61.155	N	Standard for operations that convert asbestos containing waste material into nonasbestos (asbestos-free) material	It is not anticipated that the removal action will include any such treatment of asbestos containing materials. This section will be applicable if treatment occurs.

A: Applicable
R: Relevant & Appropriate
N: Scope of the action does not trigger this requirement
X: Not an ARAR

Statute	Implementing Regulation	Status	Requirements	Comments
TSCA	40 CFR Part 763, Subpart G (implemented by the State under the Montana Asbestos Control Act)	X	Asbestos Abatement Projects	The State requires that work be performed in accordance with 40 CFR 763.120 and 763.121 (asbestos abatement projects) and 29 CFR 1926.58 (asbestos standard for the construction industry). These requirements will be incorporated into the health & safety plan but do not meet the definition of an ARAR.
National Historic Preservation Act	36 CFR 800 40 CFR 6.301 (b) 43 CFR 7	A	Establishes procedures to take into account the effect of actions on any historical properties included on or eligible for inclusion on the National Register of Historic Places. If the activity will have an adverse effect, and this effect can not be reasonably avoided, measures need to be taken to minimize or mitigate the effects.	If cultural resources on or eligible for the national register are present, it will be necessary to determine if there will be an adverse effect and if so how the effect may be minimized or mitigated.
Archeological and Historic Preservation Act		A	Provides for the preservation of historical and archeological data that might be lost as part of a federal action. It differs from NHPA in that it encompasses a broader range of resources than those listed on the National Register and mandates only the preservation of data (including analysis and publication).	

A: Applicable
R: Relevant & Appropriate
N: Scope of the action does not trigger this requirement
X: Not an ARAR

Statute	Implementing Regulation	Status	Requirements	Comments
STATE ARARS				
Section 75-5-605 of the Montana Water Quality Act		A	Prohibits the causing of pollution of any state waters. Section 75-5-103(21)(a)(i) defines pollution as contamination or other alteration of physical, chemical, or biological properties of state waters which exceeds that permitted by the water quality standards. States that it is unlawful to place or cause to be placed any wastes where they will cause pollution of any state waters. Any permitted placement of waste is not placement if the agency's permitting authority contains provisions for review of the placement of materials to ensure it will not cause pollution to state waters.	These requirements would be triggered only in the event that the removal action impacts surface of ground waters. Excavation may take place close to the Kootenai River. Precautions will need to be put into place to prevent accidental release of asbestos containing soils into the river. May also be applicable if disposal of RACM occurs on-site.
Section 75-5-303, Montana Code Annotated (MCA)		A	States that existing uses of state waters and the level of water quality necessary to protect the uses must be maintained and protected.	

A: Applicable
R: Relevant & Appropriate
N: Scope of the action does not trigger this requirement
X: Not an ARAR

Statute	Implementing Regulation	Status	Requirements	Comments
Montana Water Quality Control Act	ARM 17.30.609	A	Designates classification of State waters	The site of these potential Libby Asbestos removal actions is located on the Kootenai River and Rainy Creek. Pursuant to ARM 17.30.609, the water-use classification adopted for the Kootenai River is B-1 except for the portion of the river which includes Rainy Creek (mainstem) from the W.R. Grace Company water supply intake to the Kootenai River, which is designated C-1.
Montana Water Quality Control Act	ARM 17.30.623	A	Establishes standards for B-1 waters. The B-1 classification standards provides that concentrations of carcinogenic, bioconcentrating, toxic, or harmful parameters which would remain in the water after conventional water treatment may not exceed the applicable standards set forth in the current version of circular WQB-7. For asbestos fibers longer that 10 microns in length, the WQB-7 surface water standard is 7,000,000 fibers/liter.	Will be applicable if there is a discharge to the Kootenai River.

A: Applicable
R: Relevant & Appropriate
N: Scope of the action does not trigger this requirement
X: Not an ARAR

Statute	Implementing Regulation	Status	Requirements	Comments
Montana Water Quality Control Act	ARM 17.30.626	A	Establishes classifications for C-1 waters. The C-1 classification standards provide that concentrations of carcinogenic, bioconcentrating, toxic or harmful parameters may not exceed levels which render the water harmful, detrimental, or injurious to public health. Concentrations of toxic parameters also may not exceed the applicable standards specified in WQB-7. Discharges shall conform with nondegradation rules and may not cause receiving water concentrations to exceed the applicable standards specified in WQB-7. For asbestos fibers longer that 10 microns in length, the WQB-7 surface water standard is 7,000,000 fibers/liter.	Will be applicable if there is a discharge to Rainy Creek.
Montana Water Quality Control Act	ARM 17.30.705	A	Requires that for any surface water, existing and anticipated uses and the water quality necessary to protect these uses must be maintained and protected unless degradation is allowed under the nondegradation rules at ARM 17.30.708.	

A: Applicable
R: Relevant & Appropriate
N: Scope of the action does not trigger this requirement
X: Not an ARAR

Statute	Implementing Regulation	Status	Requirements	Comments
Montana Water Quality Control Act Title 17, Chapter 30, Sub-Chapter 6, and Title 17, Chapter 30, Sub-Chapter 13	ARM 17.30.1332	A	The Water Quality Division has issued general stormwater permits for certain activities. The substantive requirements of the following permits are applicable for the following activities: (1) for construction activities: General Discharge Permit for Storm Water Associated with Construction Activity, Permit No. MTR100000 (May 19, 1997) (2) for disposal within the permitted mine boundaries: General Discharge Permit for Storm Water Associated with Mining and with Oil and Gas Activities, Permit No. MTR300000 (September 10, 1997).	Generally, the permits require the permittee to implement Best Management Practices (BMP) and to take all reasonable steps to minimize or prevent any discharge which has a reasonable likelihood of adversely affecting human health or the environment. However, if there is evidence indicating potential or realized impacts on water quality due to any storm water discharge associated with the activity, other substantive requirements may be necessary.
Montana Water Quality Control Act	ARM 17.30.637	A	Prohibits discharges containing substances that will (a) settle to form objectionable sludge deposits or emulsions beneath the surface of the water or upon adjoining shorelines; (b) create floating debris, scum, a visible oil film (or be present in concentrations at or in excess of 10 milligrams per liter) or globules of grease or other floating materials; (c) produce odors, colors or other conditions which create a nuisance or render undesirable tastes to fish flesh or make fish inedible; (d)create concentrations or combinations of materials which are toxic or harmful to human, animal, plant or aquatic life; (e)create conditions which produce undesirable aquatic life.	These requirements would be applicable to any surface water discharges.

A: Applicable
R: Relevant & Appropriate
N: Scope of the action does not trigger this requirement
X: Not an ARAR

Statute	Implementing Regulation	Status	Requirements	Comments
	ARM 17.30.1011	N	Provides that any groundwater whose existing quality is higher than the standard for its classification must be maintained at that high quality unless degradation may be allowed under the principles established in Section 75-5-303, MCA, and the nondegradation rules at ARM Title 17, chapter 30, subchapter 7.	These actions are not expected to affect ground water.
Floodplain and Floodway Management Act	ARM 36.15.602(5), 36.15.605, 36.15.703	N	Solid and hazardous waste disposal and storage of toxic, flammable, hazardous, or explosive materials are prohibited anywhere in floodways or floodplains.	According to the National Flood Insurance Program, Floodway Boundary and Floodway Map, the Export Plant property is outside the 100 year flood plain. The Screening Plant, which is at a higher elevation is also presumed to be outside the 100 year flood plain. No solid waste disposal will occur within the floodway or floodplain.
Floodplain and Floodway Management Act	ARM 36.15.701 ARM 36.15.702(2)	N	In the flood fringe (i.e., within the floodplain but outside the floodway), residential, commercial, industrial, and other structures may be permitted subject to certain conditions relating to placement of fill, roads, and floodproofing. Standards for residential, commercial or industrial structures are found in ARM 36.15.702(2)	According to the National Flood Insurance Program, Floodway Boundary and Floodway Map, the Export Plant property is outside the 100 year flood plain. The Screening Plant, which is at a higher elevation is also presumed to be outside the 100 year flood plain.

A: Applicable
R: Relevant & Appropriate
N: Scope of the action does not trigger this requirement
X: Not an ARAR

Statute	Implementing Regulation	Status	Requirements	Comments
The Natural Streambed and Land Preservation Act of 1975, MCA 75-7-101 et seq.	ARM 36.2.410	A	Establishes minimum standards if a project alters or affects a streambed, including any channel change, new diversion, riprap or other streambank protection project, jetty, new dam or reservoir or other commercial, industrial or residential development.	The removal actions may require streambank protection. If so, the substantive portions of these requirements would be applicable.
Strip and Underground Mine Reclamation Act	ARM 17.24.500-761	R	Establishes detailed requirements for reclamation of mines.	Certain requirements associated with required soil cover, minimizing erosion and runoff, establishing an effective vegetative cover using native species, soil amendments and control of fugitive emissions are considered relevant and appropriate to the disposal site (unless a commercial facility is used).
Montana Asbestos Control Act 75-2-501 et. seq.	ARM 17.74.301 et. seq.	See below for specific regula-tions	The Montana Asbestos Control Act, and implementing rules establish standards and procedures for accreditation of asbestos-related occupations and control of the work performed by persons in asbestos-related occupations.	

A: Applicable
R: Relevant & Appropriate
N: Scope of the action does not trigger this requirement
X: Not an ARAR

Statute	Implementing Regulation	Status	Requirements	Comments
Montana Asbestos Control Act	ARM17.74.302(3) ARM 17.74.314	X	Requirements of accreditation and permitting for persons engaged in an asbestos-type occupation. No person may engage in an asbestos-type occupation unless accredited in that occupation or may employ or subcontract with nonaccredited individuals or contractors. No person may conduct an asbestos abatement project without a permit. Section 75-2-511, MCA. Accreditation requirements --restrictions. A permit from DEQ is required before any person can conduct an asbestos project. The definition of "asbestos project" includes the removal, transportation, or disposal of asbestos-containing waste (defined in section 75-2-502(4), MCA & ARM 17.74.302(3). In addition, a person who inspects, plans, designs, supervises, contracts for or works on an asbestos project must meet DEQ training and accreditation requirements.	The substantive accreditation requirements will be met by the contractors used. On-site CERCLA actions do not require a permit. These requirements will be addressed as part of the Health & Safety Plan but do not meet the definition of an ARAR.
Montana Asbestos Control Act	ARM 17.74.308	A R	Establishes air monitoring requirements for asbestos abatement projects, including for building clearance after abatement.	These requirements will be followed unless an equivalent or more stringent approach is deemed appropriate.

A: Applicable
R: Relevant & Appropriate
N: Scope of the action does not trigger this requirement
X: Not an ARAR

Statute	Implementing Regulation	Status	Requirements	Comments
Montana Asbestos Control Act	ARM 17.74.335.	A R	Asbestos abatement project permits. Asbestos abatement projects require a permit from DEQ. The permit conditions include but are not limited to: a. a requirement that all work performed be in accordance with 29 CFR Section 1926.58 (asbestos standards for the construction industry); and 40 CFR Section 763.120, 121 (requirements for asbestos abatement projects); b. a requirement that all asbestos be properly disposed in an approved asbestos disposal facility. "Approved asbestos disposal facility" is defined at ARM 17.54.302(1) as a properly operated and licensed class II landfill as described in ARM 17.50.504; c. a requirement that asbestos be disposed in accordance with 40 CFR Part 61, Subpart M (National Emission Standard for Asbestos). See discussion above on National Emission Standard for Asbestos.	Applicable to work meeting the definition of RACM. Relevant and Appropriate for soils or contaminated material that does not meet the strict definition of RACM. The substantive requirements for performance of the work and proper disposal and will be met by the contractors used. On-site CERCLA actions do not require a permit.

A: Applicable
R: Relevant & Appropriate
N: Scope of the action does not trigger this requirement
X: Not an ARAR

Statute	Implementing Regulation	Status	Requirements	Comments
Montana Asbestos Control Act	ARM 17.74.338	X	Asbestos abatement project control measures. An accredited asbestos abatement supervisor must be physically present at all times at the work-site where a permitted asbestos abatement project is being performed and must be accessible to all workers. On-site air monitoring must be conducted by an accredited asbestos contractor/supervisor, an engineer or industrial hygienist.	These requirements will be addressed as part of the Health & Safety Plan but do not meet the definition of an ARAR.
Montana Asbestos Control Act	ARM 17.74.341.	X	Record keeping. Records of each asbestos abatement project must be retained for a minimum of 30 years and must be made available to DEQ at any reasonable time. This section provides a non-inclusive list of the records to be retained.	These are procedural requirements that do not meet the definition of an ARAR. Appropriate record keeping for medical records will be addressed in the Health & Safety Plan.

A: Applicable
R: Relevant & Appropriate
N: Scope of the action does not trigger this requirement
X: Not an ARAR

Statute	Implementing Regulation	Status	Requirements	Comments
	ARM 17.8.220	A	Ambient air quality standard for settled particulate matter. Particulate matter concentrations in the ambient air shall not exceed the following 30-day average: 10 grams per square meter.	The removal action will involve significant soil disturbance. Particulate/dust levels will need to be controlled.
	ARM 17.8.223	A	Ambient air quality standards for PM-10. PM-10 concentrations in the ambient air shall not exceed the following standards: 150 micrograms/cubic meter of air, 24-hour average; and 50 micrograms/cubic meter of air, expected annual average.	Each of the ambient air quality standards includes specific requirements and methodologies for monitoring and detection. These requirements will be followed unless an equivalent or more stringent approach is deemed appropriate.
	ARM 17.8.308	R	Airborne Particulate Matter. Emissions of airborne particulate matter from any stationary source shall not exhibit an opacity of 20 percent or greater, averaged over six consecutive minutes. This standard applies to the production, handling, transportation, or storage of any material; to the use of streets, roads, or parking lots; and to construction or demolition projects.	

A: Applicable
R: Relevant & Appropriate
N: Scope of the action does not trigger this requirement
X: Not an ARAR

Statute	Implementing Regulation	Status	Requirements	Comments
	ARM 17.8.204 ARM 17.8.206	R	Ambient Air Monitoring & Ambient Air Methods and Data: Require that all ambient air monitoring, sampling and data collection, recording, analysis and transmittal shall be in compliance with the Montana Quality Assurance Manual except when more stringent requirements are determined to be necessary.	These requirements will be followed unless an equivalent or more stringent approach is deemed appropriate.
	ARM 17.8.304	A	Visible Air Contaminants. No source may discharge emissions into the atmosphere that exhibit an opacity of 20 percent or greater, averaged over six consecutive minutes. This standard is limited to point sources, but excludes wood waste burners, incinerators, and motor vehicles.	No visible emissions are anticipated.
	ARM 17.8.315	N	Odors. If a business or other activity will create odors, those odors must be controlled, and no business or activity may cause a public nuisance.	Action is not expected to produce nuisance level odors.

A: Applicable
R: Relevant & Appropriate
N: Scope of the action does not trigger this requirement
X: Not an ARAR

Statute	Implementing Regulation	Status	Requirements	Comments
§ 50-64-104 Montana Code Annotated (MCA)		A	This section provides for various safeguards to prevent release of asbestos into the air during demolition. The prescribed safeguards include notification of the local fire department, posting of warning signs, wetting of surfaces, dust emission control, covering and wetting during transport, and depositing where materials are unlikely to be disturbed.	These standards are applicable to building demolition and relevant and appropriate to other removal activities.
50-64-104(7) MCA		A	Requires prevention of asbestos dust dispersion during transportation by requiring debris to be covered, enclosed and wetted.	These standards are applicable to building demolition and relevant and appropriate to other removal activities.
Montana Hazardous Waste Act 75-10-401 et seq., MCA		N	Regulations under this act establish a regulatory structure for the generation, transportation, treatment, storage and disposal of hazardous wastes.	At this time, it is not anticipated that material meeting the definition of hazardous waste will be disturbed or encountered.

A: Applicable
R: Relevant & Appropriate
N: Scope of the action does not trigger this requirement
X: Not an ARAR

Statute	Implementing Regulation	Status	Requirements	Comments
	ARM 17.50.500 - 531	A	Establishes standards for handling and disposal of solid waste. Asbestos waste generated by this removal are Group II solid wastes.	These standards would be applicable for management of materials and any disposal which occurs on-site but outside of the Libby Mine operating permitted boundary. These standards do not apply to disposal which occurs within the Libby Mine operating permitted boundary. For off-site disposal, these standards would need to be met by the permitted solid waste management facility.
Occupational Health Act, §§ 50-70-101 et seq., MCA.	ARM §17.74.101 ARM §17.74.102	X	ARM §17.74.101, along with the similar federal standard in 29 CFR §1910.95, addresses occupational noise. ARM § 17.74.102, along with the similar federal standard in 29 CFR §1910.1000 addresses occupational air contaminants.	These requirements will be addressed as part of the Health & Safety Plan and do not meet the definition of an ARAR.

A: Applicable
R: Relevant & Appropriate
N: Scope of the action does not trigger this requirement
X: Not an ARAR

Statute	Implementing Regulation	Status	Requirements	Comments
Montana Safety Act §§ 50-71-201, 202 and 203, MCA,		X	State that every employer must provide and maintain a safe place of employment, provide and require use of safety devices and safeguards, and ensure that operations and processes are reasonably adequate to render the place of employment safe. §	These requirements will be addressed as part of the Health & Safety Plan and do not meet the definition of an ARAR.
Employee and Community Hazardous Chemical Information Act §§50-78-201, 202, and 204, MCA		X	State that each employer must post notice of employee rights, maintain at the work place a list of chemical names of each chemical in the work place, and indicate the work area where the chemical is stored or used. Employees must be informed of the chemicals at the work place and trained in the proper handling of the chemicals.	These requirements will be addressed as part of the Health & Safety Plan and do not meet the definition of an ARAR.

A: Applicable
R: Relevant & Appropriate
N: Scope of the action does not trigger this requirement
X: Not an ARAR